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COMPARATIVE STUDY AND RACIAL ANALYSIS
OF THE HUMAN REMAINS
OF
INDUS VALLEY CIVILIZATION
WITH PARTICULAR REFERENCE TO HARAPPA

1784

Dr. B. K. Chatterjee
Sri G. D. Kumar

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By

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INTRODUCTION

THE discovery of the ancient sites at Mohenjo-daro, Chanhu-daro, Harappa, Rupar and Lothal etc. has revealed a picture of early civilization in India as far back as third millennium B.C. On the evidence of pre-historic finds, particularly pottery, seal, terracotta figurines etc. Indus Valley Civilization was closely related to the ancient culture of Sumer, Elam & Mesopotamia. A provisional dating of the Indus Valley Civilization was attributed to chalcolithic period from 2500 to 1500 B.C. Recent excavations of several Harappan sites showed a wide distribution of the civilization, extending from Sutkagen-dor, near the coast of the Arabian Sea to Rupar at the foot of the Simla Hills on the fringe of the Himalayas.

The present study is based on the skeletal finds mainly from Harappan site situated in the district of Montgomery of the Punjab, now in West Pakistan. Harappan site overlies the mounds of very ancient city covering a circuit of about 3 miles. The mounds were a prominient site of Indus Valley Civilization, which was first visited by Charles Masson[1] in 1826, by Burnes five years later and subsequently by Sir Alexander Cunningham[3] in the year 1853 and 1856. Burnes remarked that the area of the ruins was about three miles in circuit while Cunningham stated that the raised mound formed an irregular square of only half a mile on each side or two miles in circuits—containing the remains of walled town covered with broken bricks. Later on, excavations at Harappa were carried out by the Archaeological Survey of India, during the period of 1920-21 and again from 1933 to 1934, 1937-41 and 1946. Subsequently after the separation of Harappa from Indian Union the prehistoric sites were further excavated by Pakistan Government.

About the early history of Harappa it is stated that the city of Harappa or Hari—Yūpuya existed in ancient Vedic times, mentioned in the Rigveda (vi, xxvii, 5) as the scene of the defeat of the Vrcivants by Indra who fought on the side of the King Abhyavartin Cayamana[4]. From this fact it was indicated that city of Hari—yupuya or Harappa was the capital of Arya Emperor where non-Aryan tribes Vrcivants fought with the Aryans.

From the year 1926 to 1934 and 1937 to 1946 systematic excavations were carried out, but in 1937 cemetery site at Harappa, known as R. 37 was discovered to the north west of the site where about fifty human burials were unearthed. The cemetery site was further excavated during the year 1946 which showed that the dead bodies were placed in an extended position with the head generally placed towards northernly direction. Almost all the burials were accompanied with painted potteries placed at the head of the body. A few number of pottery was also placed at the feet as well as below the body. Some personal ornaments such as copper ring, necklace of steatite beads, anklets of paste, beads, earring of copper wire etc. were also some time found worn by the dead. Apart from these there were also some toilet objects such as handled copper mirror, mirrors made of pearl shells were also found during the excavation period of 1937-46.

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1. Masson C.1842—Narrative of various journeys of Beluchistan & Afghanistan, London, I, p. 452
2. Burnes A. 1834—Travels into Bokhara, London, part III, p—137
3. Cunningham A. 1853 & 1872—73—Report of Archaeological Survery of India, part V, p. 18
4. Wheeler R.E.M. 1960—The Indus Civilization (Cambridge History of India, p. 20)

N.B. Mohenjo-daro is situated in Larkana district in Sind, Harappa in the district of Montgomery in Punjab, Chanhu-daro near Sakrand, in Sind Rupar in Ambala district, (Uttar Pradesh) and Lothal is in the district of Ahmedabad.

One interesting find discovered in 1946 was a coffin-burial in which the evidence of reedshroud pointed out the similarity with coffin burials of the Sargonid and pre-Sargonid periods of Mesopotamia[5].

At Harappa it was observed that there were two ways of disposal of the dead bodies, one earlier and the other later. The former method of disposal included either entire or fractional burial in which the dead bodies were generally associated with some funerary pottery or grave furniture having consigned to earth which was known as earth burials. Later burials were distinguished as pot burials, in which the skeletal remains which remained after exposure to birds or beasts, were ultimately deposited in the urns. Most probably this method was followed in post Harappan burials of cemetery H.

Regarding the stratifications of Harappa Vats[6] was of opinion that the strata varied considerably in different mounds which were not contemporary with each other. On the basis of evidence of chronology, he propounded the tentative and comparative age of the mounds—viz. mound F, AB, Area J & G and Cemetery H. which are as follows :—

Mound F comprises VIII as early strata dated first half of 4th millenium B.C., IV to VII strata belonged to circa 3050 B.C. to 3500 B.C. and strata I to IIIrd to circa 2750 to 3050 B.C. Mound AB comprised V to VIth strata belonged to before circa 3050 B.C. and 1st to IV strata were contemporary with the late period in Mound F. Area J comprised strata I to II belonged to circa 2850 to 3050 B.C. and strata IIIrd to IVth were before circa 3050 B.C. Area G comprised I to IInd strata belonged to circa 2700 to 2800 B.C. while IIIrd strata to circa 3250 B.C. Cemetery H comprised two strata I & II belonging to circa 2000 to 2500 B.C.

Wheeler[7] remarked that the cemetery H of Harappa comprised two strata, a lower and an older one known as stratum II, about six feet below the present surface and a higher strata I, overlying stratum II and extending beyond it towards the east at a depth of two or three feet from surface. The lower and older strata consisted of open or extended burials and stratum II comprised true fractional burials in which some of the skeletal remains after exposure to birds or beasts were ultimately deposited in large vessels known as burial urns. Stratum I & II were stratigraphically later than R. 37 which was identified as one regular cemetery where 57 graves of matured Harappan stage were discovered during the period of 1937 and 1946. Apart from these, other human bones of Harappan age were also excavated from Area G[9] on the south-eastern outskirts of the site, where a tightly packed mass of human skulls intermixed with a small number of long bones were discovered between 4 ft. and 5 ft. 10 in. below the present surface.

Regarding the occupation & settlement of the Harappan people Wheeler further remarked that at Harappa a group of people of unknown origin came and built the houses among the ruins, after abandonment of the village. Their burial rites were at first by inhumation but later on the custom of exposing the dead and subsequently interring the selected bones in large urns were introduced.

Marshall[10] was of opinion that the chalcolithic culture of Indus Valley resemble the second Pre-Diluvian culture of Elam, Mesopotamia and the proto-historic culture of Sumer and further he added that the cultural intercourse must have been going on between these countries at the close of fourth millenium B.C. Stein[11] remarked that the ceramic culture of the Indus Valley and other remains showed unmistakable affinity to the corresponding antiquities of the earliest strata at Susa and other chalcolithic sites in south-western Persia as well as remains at Anau in the north-east Iran. Further he was of opinion that Susa I pottery type which was discovered at the Mashkai Valley and pre-historic pottery of Waziristan and Beluchistan were similar to that of Mohenjo-daro and Harappa. He added that certain figurines at Mohenjo-daro resemble strikingly those found in chalcolithic sites at Makran and Jhalawan and thus he tried to link up the Indus Valley civilization and Iran with Eastern Mesopotamia.

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[5] Woolley C.L.—1934—Ur Excavations Vol. II, the Royal Cemetery (London & Philadelphia)
[6] Vats M.S. 1940—Excavations at Harappa, p. 9-10
[7] Wheeler R. E. M. 1960—The Indus Civilization, (Cambridge History of India, p. 4, p. 54)
[8] Wheeler R. E. M. 1947—Ancient India, No. 3, p. 83
[9] Wheeler R. E. M. 1960—Indus Civilization (Cambridge History of India, p. 54)
[10] Marshall J. H. 1931—Mohenjo-daro and Indus Valley Civilization

In the present study the craniometric measurements and cranioscopic observations were attempted on thirty eight adult male and thirty four adult female skulls. Measurements were taken according to International Agreement reached at Monaco in 1906 and Geneva 1912 and subsequent modifications and techniques mainly after Martin,[12] Mollison[13] and Wilder[14] were also followed. Apart from these cranioscopic observations after B. Oetteking[15] were also incorporated.

It should be remarked that the skulls and long bones were too fragile and in the majority of them were too fragmentary. So before attempting to study them special precautions were taken by strengthening them with the help of chemical solution. Certain skulls were found deformed either slightly or to a greater extent. So special care was taken before taking their measurements. The majority of long bones, particularly the femur, tibia, humerus, radius, ulna and fibulae etc. were noticed either in broken condition or actual anatomical land marks were not traceable. So, attempt was made to measure & calculate the living stature of the body from the best available long bones on the basis of the relevant formulae propunded by Manouvrier[16]. The linear measurements were taken with the help of spreading caliper and sliding compass and cranial circumference and arcs by metric steel tape. Cranial profile contours were drawn by Martin's Diagraph and different angles were measured on craniograms by means of protractor. The angles of mandibles were measured by Mandibulometer. The locations of different landmarks were followed after Martin's and Wilder's descriptions. Direct measurement of the cranial capacity was not attempted as the condition of the skulls did not favour. So cranial capacities were estimated with the help of the inter-racial formulae propounded by Lee & Pearson[17] on the basis of length, breadth and height measurements of the skulls. All the linear measurements have been recorded in millimetres and the angular measurements were noted in degrees.

In the following chapters analysis of the mean values, standard deviations with their standard errors and the range of variation of the different cranial, facial, nasal & orbital measurements and indices as well as mandibular and angular measurements on craniograms of adult male & female Harappa crania were incorporated.

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11. Stein A. 1937—Archaeological Reconnaissances in N.W. India & S.E. Iran
12. Martin R. & Saller K—1956—Lehrbuch der Anthropologie, p. 429, p. 470, pp. 482—499
13. Mollison von T. 1938—Spezille Methoden Anthropologischer Messung
14. Wilder H. 1920—A Laboratory Manual of Anthropometry
15. Bruno Oetteking 1930—Craniology of the North Pacific Coast, Vol XI
16. Manouvrier 1893—Le determination de la taille apres les grands os des membres (Memoir de la Societa de D' Anthropologie, Paris)
17. Lee Pearson (1906)—Data for the problem of evolution of Man. (Philosophical Trans. Royal Soc. of London, Vol 196, p. 247)

ANALYSIS

THE maximum cranial length of the pooled series of Harappa male and female crania ranged from 198—167 mm. and 195—135 mm. respectively while the mean values were 183.97 ± 1.18 and 177.64±2.11. The standard deviation in the case of the female crania was 10.57±1.50 but that of the male was 6.82±0.83 which showed that the female skulls varied to a greater extent than male. This contention was further supported by the presence of high values of co-efficient of variation noticed in female crania which was 5.95±0.85 while that of the male was 3.71±0.46.

The mean values of the cranial breadth were 134.78±1.23 for the male and 129.89±1.59 for the female, but the cranial breadth ranged from 151—123 mm. and 141—110 mm. respectively. It shows the presence of appreciable variability in this character particularly among the female members. The standard deviations were 6.53±0.87 and 6.94±1.12 in male and female respectively. Auricular height ranged from 127—90, and 122—89 in male and female. It shows the variability was high in both the sexes. But the mean values were 113.58±1.43 in male and 105.00±1.64 in female.

Basion bregmatic height varies considerably, it ranged from 146—124 mm. and 144—100 mm. among the male and the female members respectively while the mean values were 132.38±1.01 and 127.05±2.03. It should be remarked that the standard deviation was appreciably high in female skulls being 9.31±1.43 whereas in case of male it was 4.93±0.72. The mean values of the cranial module were 143.02±1.33 for the male and 137.97±0.95 for the female and the standard deviation was petty high in male, being 7.30±0.94, whereas it was 3.91±0.67 in female. It ranged from 154.66—115.66 in male and 147.33—131.13 in female.

Horizontal circumference of the Harappa pooled male and female skulls varied from 630—483 mm. and 532—475 mm. respectively. But the mean values were 523.67±4.58 in male and 498.86± 2.61 in female. Standard deviation was appreciably high in male being 26.28±3.24 whereas in female it was only 12.24±1.85.

It was interesting to note that the cranial capacity ranged from 1655.02—1115.19 c.c.m. in male while it was 1411.53—1051.34 c.c.m among the female members. The mean values were 1388.96± 22.08 in male and 1232.08±25.20 in female. The standard deviation was appreciably high in both the sexes being 116.84±15.62 and 118.22±17.83 respectively.

Cranial index varied from 80.11—65.43 in male and 81.48—66.67 in female. It shows the variable is appreciable. The mean values of the cranial index were 73.09±0.73 in male and 73.31±0.79 in female and the standard deviations were 3.84±0.52 and 3.46±0.56 respectively.

Length height index ranged from 78.53—65.46 in male and from 82.04—64.04 in female skulls, but the mean values were 71.84±0.64 and 72.17±2.12 respectively. It was interesting to note that the standard deviation was comparatively high in female being 9.52±1.50 while in male it was only 3.37±0.46.

Breadth-height index varied from 109.72—89.29 in male and from 109.44—90.91 in female, the variability in this character was not appreciably high. The mean values were 99.38±1.09 in male and 98.75±2.61 in female and the standard deviations were 5.11±0.75 and 6.10±1.43 respectively.

± indicates the standard errors of the respective mean & standard deviations of the measurements.

It appears that the length auricular height index ranged from 68.18—55.05 in male and from 64.37—51.45 in female. The average length auricular height index was 61.96±0.79 in male and 59.16±1.09 in female, the standard deviations were 4.44±0.55 and 4.98±0.77 respectively.

The mean value of median sagittal cranial arcs is 372.71±2.96 for the male and 353.04± 7·00 for the female and the range of variation was 400—344, 395—230 respectively, it shows the variations were remarkable. It was interesting to note that the standard deviation for the male was 15.68 ±2.10 and that of the female was pretty high being 33.61±4.96.

Frontal arc ranged from 140—101, and 140—105 in male and female while the mean values were 126.24±1.42 and 121.65±1.60 respectively. The standard deviations were not very high in both the sexes being 7.67±1.01 for the male and 7.68±1.13 for the female.

The mean values of the parietal arcs are 129.68±2.65 for the male and 120.70±1.39 for the female, the difference between the two sexes is 8.98 mm. which is appreciable. The standard deviation in the case of male is appreciably high which is 14.78±1.88, while in female it is 6.23± 0.99. The parietal arcs ranged from 160—96 and from 140—110 in male and female respectively. The mean value of the occipital arc in the case of the male skull was 113.90±2.55 while in female it was 117.86±2.60, but the standard deviations were 13.73±1.80 and 11.93±1.84 respectively. It ranged from 140—88 and 141—105 in male and female respectively—the variation is appreciable in both the sexes.

Transverse cranial arc varies from 325—270 in male and in female the variation is from 312—272, the mean values were 302.97±2.03 and 289.40±2.14 respectively. The standard deviations were not very high being 10.96±1.44 for the male and 9.57±1.51 for the female.

The average orbito-nasal arc for the male was 110.19±1.00 while that of the female was 103.60±1.65, but it ranged from 120—100, and 123—100 respectively. The standard deviations were not high being 5.18±0.70 and 6.40±1.17 for the male and female

The mean values of the nasion-inion line were 168.50±1.81 and 165.16±0.91 in male and female, while the standard deviations were 6.07±1.28 and 5.49±0.64, but it ranged from 187—154 mm. and 180—154 mm. respectively.

The average frontal chord for the male was 111.66±1.01 and that of the female was 107.78 ±1.24 but it ranged from 123—98 and from 119—94. The standard deviations were 5.44±0.71 and 5.95±0.88 in male and female respectively which are not high.

The parietal chord varied from 143—78 and from 126—104 in male and female while the mean values were 116.71±2.89 and 107.50±1.05 respectively. The standard deviation in male was pretty high being 14.14±2.04 but in the female it was 4.48±0.74.

The mean values of the occipital chord were 95.04±2.26 and 93.87±2.01 in male and female but it ranged from 125—78 and 111—85 respectively. The standard deviations were 11.05±1.59 for the male and 7.76±1.42 for the female.

Nasion lambda line ranged from 194—154 and from 184—163 in male and female but the mean values were 176.14±1.83 and 169.38±1.08 and the standard deviations were 8.60±1.30 and 4.32±0.76 respectively which shows the standard deviation is not high in female.

The mean values of the basion-prosthion line were 96.24±1.27 and 96.77±2.11 for the male and female while the range of variation was 109—86 for the male and 112—86 for the female, but the standard deviations were 5.62±0.90 and 6.35±1.49 respectively. In this case the standard deviation is comparatively a little high in female than in male.

The sagittal cranial curvature index ranged from 48.76—35.08 in male and from 52.50—40.75 in female, while the mean values were 44.84±0.66 and 45.55±0.64 respectively.

The mean values of the transverse cranial curvature index were 37.61±0.51 and 37.85±0.45 for the male and female while the range of variation was 41.63—30.8 and 42.12—32.85 respectively. The difference between the two means is negligible.

The fronto-sagittal arc index varies from 36.84—31.41 in male and from 36.87—31.39 in female but the mean values were 34.08 ±0.29 and 34.06±0.33 respectively, sex difference in this respect is practically nil.

The parieto sagittal arc index ranged from 42.32—28.04 in male while in female the variation was from 38.70—30.30 and the mean values were 34.76±0.72 and 33.45±0.50 respectively.

The average occipito sagittal index of the male is 30.76±0.68 while that of the female is 32.90±0.63, but it ranged from 36.50—23.28 and from 38.01—28.94 respectively.

The mean values of the frontal curvature index of the male and female are 88.85±0.79 and 88.76±0.74 respectively and it ranged from 99.01—75.38 and 97.27—82.09. In this respect also the difference between the two means is negligible.

The parietal curvature index varies from 112.97—74.29 in male and from 96.36—83.20 in female, it should be remarked that the variation in the case of the male is remarkable while in female the variation is not so high. The mean values of the male and female are 91.11±1.68 and 88.44±0.79 respectively and the difference between the two mean values is 2.67

The occipital curvature index ranged from 94.12—70.83 in male and from 90.52—68.70 in female while the mean values are 82.19±1.48 and 80.96±1.49 respectively.

The average transverse fronto parietal index for the male is 71.36±1.44 and that for the female is 70.67±0.72 while it ranged from 84.85—42.82 and from 85.38—52.78 in male and female.

The mean values of the fronto-parietal index are 102.03±2.27 and 98.14±1.42 for the male and female while it ranged from 123.07—75.00 and from 110.23—85.61 respectively. The range of variation is moderately high particularly among the male.

The fronto-occipital index ranged from 110.40—75.00 and from 120.00—81.48 in male and female but the mean values were 90.72±2.25 and 96.76±2.12 respectively. It shows the difference between the two means is 6.04 mm. which is appreciable. The range of variation is considerable in both the sexes.

The mean values of the parieto-occipital index are 88.73±3.18 for the male while 96.93 ±2.68 for the female, the difference between the two means is 8.20 in this character also. The mean value of the female is higher than that of the male. It ranged from 120.00—62.07 and from 125.45—76.92 in male and female.

The mean values of the least frontal breadth are 95.70±0.66 and 92.50±0.88 for the male and female while it ranged from 106—90 and from 100—85 respectively ; the standard deviations are 3.91±0.53 and 3.57±0.56. The range of variation is not remarkable.

The maximum bizygomatic breadths in male and female are 131.31±1.27 and 118.69±1.81 respectively and the difference between the two mean values being 12.62 which is highly appreciable. It ranged from 140—120 and from 127—105 in male and female and the standard deviations are 5.11±0.90 and 5.09±0.73 respectively.

The average superior facial height for the male is 68.40±1.37 while that of the female is 65.58±1.04 and the standard deviations are 6.14±0.97 and 5.09±0.73, but it ranged from 78—55 and from 75—54 respectively. The difference between the two mean values is not remarkable.

The mean values of the superior facial index for the male and female are 52.93±1.03 and 55.40±2.43 but it ranged from 58.02—44.20 and from 60.68—50.39 respectively. The difference between the two means is 2.47 mm.

The Zygomatico frontal index ranged from 88.24—68.70 and from 86.67—71.02 in male and female while the mean values were 73.07±0.84 and 75.55±1.61 respectively. The range of variation was not high.

The average zygomatico mandibular index of the male is 66.35±2.98 and that of female is 72.26 the difference between the two means is 5.91 while the range of variation was 74.05—60.44 and 75.21—69.80 respectively. The standard deviation for male is 7.29±2.11 and in the case of female it was not calculated due to very small sample.

Orbital breadth of the right orbit ranged from 45—37 and 45—29 in male & female while their mean values are 41.55±0.46 & 38.69±0.64 and standard deviations are 2.47±0.32 and 3.37±0.45 respectively. Orbital breadth for the left orbit ranged from 44—37 & 42—32 in male & female and their mean values are 40.74±0.37 & 38.33±0.58 and standard deviations are 12.23±1.53 and 8.63±1.98 respectively.

Orbital height for the right orbit ranged from 42—28 mm. and 40—29 mm. in male and female while the mean values are 34.50±0.63 and 33.62±0.62 respectevely and the standard deviations are 3.44±0.44 and 3.03±0.44 respectively. The range of variation of the left orbit was from 40—29 in male but in the case of female the variation was same as in the right orbit. It should be remarked that in both the cases the variation was appreciable.

The mean values of the orbital index for the right orbit were 82.55±1.32 and 84.91±1.50 for the male and female but it ranged from 102.86—68.89 and 97.20—75.61 respectively, the variation is appreciable particularly in male. Orbital index for the left orbit varies from 105.40—50.00 and from 105.56—77.50 in male and female while the mean values were 83.01±2.16 and 87.36±1.98 respectively. It appears the variation is appreciable in both the sexes.

The average inter-orbital breadth for the male was 19.41±0.61 while in the case of the female it was 18.88±0.63 but it ranged from 25—12 and from 24—14 respectively showing that variation is high in both the sexes.

The outer biorbital breadth ranged from 105—90 and 104—95 in male and female but the mean values were 98.65±0.81 and 94.70±1.06 respectively, the standard deviation was 4.12±0.57 for the male and 3.29±0.75 for the female but the difference between the two means was 3.95 mm.

Inter orbital index varied from 25.00—12.37 and 24.73—15.79 in male and female and the mean value was 19.39±0.65 and 19.65±0.69 respectively, the difference between the two mean values was negligible.

It was interesting to note that the nasal height varied from 57—41 in male and from 54—42 in female. The mean values were 51.14±0.74 and 48.32±1.30 in male and female and the difference between the two means was 2.82 mm. while their standard deviations were 3.96±0.54 and 3.20±0.92 respectively. The variation in this character shows the presence of heterogeneous nature of people apart from intermixture.

Nasal breadth ranged from 31—20 mm. and from 45—20 mm. in male and female which are also appreciable while the mean values were 26.34±0.43 and 24.04±1.00 respectively and the difference between the two averages was 2.30 mm. while the standard deviations were 2.33 ±0.30 and 2.01±0.71 in male & female.

It is remarkable that the nasal index ranged from 95.00—47.37 in male while in female it varied from 62.22—38.89, such high variation is interesting from the point of view of racial composition of the people. The mean value of the male was 51.97±1.40 while in female it was 49.60±1.02 and the difference between the two mean values was 2.37, while S. D. are 6098±0.98 and 4.92+072 respectively.

The maxillo alveolar length varied from 67—49 and from 58—40 in male and female and the mean values were 54.35±0.88 and 51.10±1.03 respectively but the difference between the two averages was 3.25 mm. The standard deviations were 4.21±0.62 in male and 4.63±0.73 in female.

The mean values of the maxillo alveolar breadth were 63.50±0.88 and 60.57±0.89 in male and female but it ranged from 72—50 and from 67—51 respectively. The difference between the two mean values was 2.93 mm. and the standard deviations were 4.31±0.62 and 4.07±0.63 in male and female.

The maxillo-alveolar index varied from 153.80—77.94 and from 142.50—80.70 in male and female, while the mean values were 119.85±2.82 and 122.58±5.06 respectively. It should be remarked that the variation was appreciable in both the sexes and the difference between the two averages was 2.73 but the standard deviations of both male & female were 11.98±1.99 and 20.88±3.58 respectively which shows a remarkable varaition.

The cranial base line (n-ba) ranged from 111—83 and from 114—86 in male and female skulls but the mean values are 98.93±0.81 and 97.52±1.52 respectively. The difference between the two averages is only 1.42 mm. The standard deviations are 4.22±0.57 and 6.56±1.08 in male and female.

The mean values of the bi-mastoid breadth are 103.35±1.22 and 98.20±2.35 for the male and female but the range of variation was 113—91 and 110—83 respectively. The difference between the two mean values was 5.15 mm. and the standard deviations were 5.05±0.85 and 7.43±1.66 in male and female.

Bi-auricular breadth ranged from 131—95 and 115—97 in male and female while the mean values were 117.32±1.23 and 109.00±0.88 respectively. The difference between the two averages was 1.35 and the standard deviations were 8.70±1.23 and 3.32±0.62. The mean values of the greatest occipital breadth are 107.53±2.21 and 105.44±2.20 for the male and female but it ranged from 118—85 and 115—99 respectively. The standard deviations are 8.56±1.56 and 6.60±1.56 in male and female.

The length of the occipital foramen ranged from 45—30 and from 43—25 in male and female skulls while the mean values are 37.24±0.76 and 34.74±0.79 respectively. The variation in this respect is little high but the standard deviations are 3.94±0.54 and 3.77±0.56.

The average breadth of the occipital foramen for the male skull was 28.65±0.66 and for the female it was 28.22±0.68, the difference between the two mean values was negligible but it ranged from 34—21 and from 35—20 respectively. The variation in this respect is also little high and the standard deviations are 3.10±0.47 and 3.32±0.48.

The mean values of the occipital foramen index were 77.05±0.93 and 79.11±2.21 for the male and female skulls, the difference between the two was 2.06 mm. and the range of variation was from 86.84—70.00 and from 100.00—63.89 respectively.

The average palatal length for the male skull was 48.18±0.81 while that of the female was 45.57±1.03 and the difference between the two means was 2.61 but it ranged from 56—43 and from 54—35 respectively. The standard deviations are 3.81±0.57 and 4.94±0.73.

The palatal breadth ranged from 47—37 and from 45—31 in male and female skulls while the mean values are 42.50±0.74 and 40.09±0.82 and the standard deviations are 3.65±0.53 and 3.85±0.58 respectively.

The mean value for the palatal index of male was 91.84±2.58 and that of the female was 86.96±2.33, the difference between the two means was 4.88. The range of variation was 109.09—75.47 for the male and 104.88—62.09 for the female. The variation was high in both the sexes. The mean value for the longitudinal cranio-facial index for the male skull was 52.42±0.69 while that of the female was 53.47±1.06 and the difference between the two means was 1.05 mm. but it ranged from 57.39—47.37 and from 59.24—47.17.

The average transverse cranio-facial index for the male skull was 98.27±1.17 and that of the female was 92.73±1.31, the difference between the two mean values was 5.54 but it ranged from 105.34—89.13 and from 97.56—87.41 respectively.

The vertico cranio-facial index varied from 59.54—41.66 in male skull while in female it was 60.00—41.04 and the respective mean values were 52.82±0.97 and 51.34±0.86.

The height of the ramus varied from 78—53 and from 64—45 in male and female mandibles while the mean values were 66.38±1.91 and 57.12±2.12 and the difference between the two mean values is 9.26 which is appreciable. The standard deviations are 7.63±1.35 and 5.99±1.50 in male and female.

The mean values of maximum breadth of the ramus were 44.00±0.89 for the male and 40.73±0.52 for the female, the breadth of the female ramus was less than that of the male by 3.27 and the variation of the breadth ranged from 52—38 and from 43—37 respectively. The standard deviations for the male and female were 3.56±0.63 and 1.74±0.37.

The minimum breadth of the ramus ranged from 38—29 and from 36—29 in male & female while the averages are 33.35±0.53 and 32.58±0.68 respectively and the difference between the two is negligible. The standard deviation for the male was 2.35±0.37 and for the female was 2.35±0.48. The averages of the height of the body of the right mandible are 29.11±0.71 and 26.33±0.88 for the male and female and the difference between the two averages is 2.78 but it ranged from 34—21 and from 29—20 respectively. The standard deviation for the male was 3.09±0.50 and that of the female was 2.65±0.62.

The height of the body of the left mandible ranged from 33—23 and from 30—21 in male and female while the mean values are 28.61±0.76 and 27.30±0.82 and the difference between the two averages is only 1.31 mm. The standard deviations are 3.24±0.54 and 2.58±0.58.

The symphyseal height varies from 36—24 and from 33—25 in male and female mandibles but the averages are 30.93±0.99 and 28.73±0.81 respectively, it shows the symphyseal height for the female is less by 2.20 mm. and the range of variation is little high. The standard deviations are 3.69±0.70 and 2.69±0.57 for the male and the female.

The mean values of the bigonial breadth are 89.00±3.13 and 81.20±2.31 for the male and female mandibles, the difference between the two averages is 7.80 which is appreciable and the range of variation is from 99—75 and from 88—74 in male and female the standard deviations are 9.38±2.21 and 5.17±1.64 respectively.

The range of variation of the bicondylar breadth is 134—90 and 114—102 in male and female mandibles while the mean values are 117.38±4.93 and 108.20±1.96 and the difference between the two sexes is 9.18 mm. which is remarkable. The standard deviation is 13.96±3.49 for the male while 4.38±1.39 for the female.

The average mandibular length for the male is 86.33±2.73 while for the female is 94.00±9.10, so the difference between the two averages is 7.67 mm. the standard deviations are 8.19±1.93 and 18.20±6.43 which shows a remarkable difference and the range of variation is from 103—77 and from 120—80 respectively. The mandibular angle varies from 114°—98° in male skull while in female it is from 120°—71° while the mean values are 108.18±1.39 and 104.67±7.08 respectively, the difference between the two averages is 3.51 mm.

The standard deviations are 4.62±0.99 and 11.34±5.01 which shows the standard deviation of the female skull is high.

The mean values of the mandibular index are 71.03±2.73 and 95.01±12.61 for the male and female skulls and the difference between the two mean values is 23.98, which shows the female index is appreciably higher than that of the male. It ranged from 77.78—60.93 and 70.17—61.60 in male and female mandibles.

The average ramus index for the male is 67.92±2.19 and for the female is 72.43±2.01, the difference between the two mean values is 4.51 mm., but it ranged from 66.61—41.09 and 76.78—62.50 respectively.

The mean values of the calvarial base line on craniogram are 166.70±1.52 and 161. 57±1.50 in male and female skulls but it ranged from 177—147 and from 168—148 respectively. The difference between the two averages is 5.13 mm.

The calvarial height ranged from 126—85 and from 114—91 in male and female skulls while the averages are 107.31±1.75 and 102.50±1.41 respectively, the difference between the two sexes in their averages is 4.81 mm. and the standard deviations are 8.49±1.00. The range of variation is little high in male.

The mean values of lambda calvarial height are 71.55±1.61 and 67.71±1.39 while their standard deviations are 7.24±1.14 and 5.18±0.98 in male and female respectively. The difference between the two sexes in their averages is 3.84 mm. and the range of variation is 90—55 & 78—60 respectively. The bregma position line ranged from 110—80 and from 102—84 in male and female but the averages are 96.58±1.49 and 92.92±1.35 and their difference is 3.66 mm. and the standard deviations are 7.28±1.05 and 4.89±0.96 respectively.

The mean values of the nasion to foot of bregma perpendicular are 54.46±1.73 and 49.23±1.58 in male and female and the variation is from 76—40 and from 56—40 respectively. The standard deviations are 8.50±1.23 and 5.72±1.12.

Nasion to foot of meatal perpendicular varies from 105—80 in male but it ranged from 97—82 in female while the mean values are 89.74±1.12 and 87.75±1.08 respectively and the difference between the two means is 1.99 mm. The standard deviation for the male is 5.40±0.80 and for the female is 4.30±0.76.

The mean values for the auditory meatus position index are 54.45±1.27 in male and 53.86±0.75 in female while the standard deviations are 5.95±0.90 and 2.96±0.56 respectively. It ranged from 64.04—40.00 and from 57.31—48.80.

The calvarial height index varies from 74.82—50.55 and from 69.09—55.48 while the mean values are 64.38±1.17 and 63.51±1.07 in male and female respectively. The difference between the two means is 0.87 which is negligible. The standard deviations are 5.96±0.83 and 4.00±0.76.

The average bregma position index for the male is 32.56±0.90 and for the female is 30.27±0.99 but it ranged from 44.37—25.97 and from 38.27—24.39 in male and female and the standard deviations are 4.52±0.64 and 3.59±0.70 respectively.

The lambda calvarial height index ranged from 48.12—34.37 and from 45.61—35.29 in male and female while the averages are 40.84±0.77 and 39.84±0.79 respectively.

The mean value of relation of post auricular length to total length of the skull in the case of male is 0.53±0.01 while that of the female is 0.54±0.01 but it ranged from 0.59—0.47 and from 0.59—0.48 in male and female respectively.

The mean values of the frontal profile angle estimated on craniograms of male and female skulls are 83.59±1.44 and 84.25±1.66 respectively but the range of variation was from

102°—70° and from 93°—72° while the S.D. for the male was 7.21±1.01 and for the female was 6.63±1.17.

The range of variation of the facial profile angle is from 94°—78° and from 88°—72° in male and female while the averages are 84.00±0.83 and 81.75±1.09 and the standard deviations of the respective sex are 3.92±0.59 and 4.37±0.77.

The mean values of the alveolar profile angle are 79.12±2.39 and 76.64±2.96 in male and female but the range of variation is from 109°—61° and from 70°—56° and the standard deviations of the respective sex are 14.79±2.13 and 11.08±2.09. It should be remarked that the variation is high in both the sexes, particularly in male.

The average nasal profile angle is 86.20±0.82 in male and 84.14±0.97 in female but the range of variation is from 95°—76° and from 90°—78° and the respective standard deviations are 4.10±0.58 and 3.63±0.69.

The mean values of the frontal inclination angle are 63.71±1.60 and 63.08±1.24 for the male and female respectively but the respective range of variation is from 70°—56° and from 87°—54° and the standard deviations are 7.82±1.13 and 4.46±0.87.

The averages of the occipital inclination angle are 84.61±1.33 and 85.69±1.45 for the male and female but the respective range of variation is 110°—75° and 92°—76° while the standard deviations are 6.39±0.94 and 5.25±1.03.

The average of the calvarial base angle of the male is 13.29±0.67 and that of the female is 13.86±0.98 while the respective range of variation is from 19°—7° and from 20°—10° and the standard deviations are 3.26±0.47 and 3.68±0.70.

The average superior facial length angle is 41.04 and 40.71 for the male & female respectively while the respective range of variation is from 51°—25° and from 48°—34° and standard deviations are 5.81 & 3.52.

The mean values of inclination angle of occipital foramen are 14.69 and 16.82 for the male & female respectively and the range of variation is from 25°—60° and from 25°—10° and their standard deviations are 5.96 & 4.28.

The analysis of different cranial, facial, nasal and orbital characters of adult male & female Harappa crania and the oesteometric measurements of long bones revealed the presence of the following characters among Harappa people.

The living stature of the Harappa people calculated on the basis of formulae propounded by Karl Pearson[19] and by Manouvrier[18] on long bones varied from very tall to short, *i.e.*, 1837 mm. to 1519 mm. in male, while in female it varied from medium to short *i.e.* 1636 mm. to 1463 mm. But average heights of people were 1674.84 and 1545.61 in male & female respectively. The majority of the people possessed long heads, *i.e.*, dolichocranial among male (41.18%) and female (53.85%) having average cranial index 73.09 and 73.31 respectively. The percentage of medium *i.e.* mesocranial and hyperdolichocranial types of head was also appreciably high among them. The presence of broad headed type was very low, the percentages being 2.94 and 3.85 in male & female respectively. The highest percentage of people possessed orthocranial and acrocranial types of head among males and chamaecranial and metriocranial types among females ; but occurrence of hypsicranial and tapeinocranial types was comparatively low among them. The majority of the people possessed either medium (mesorrhine) or broad flat noses

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18. Karl Pearson—On the reconstruction of Stature of Pre-historic Races Phil. Trans. Royal Soc.of London. 1898, Vol. 192
19. Manouvrier —Le determination de la taille apres les grands os des membres Memoir de la Societa d' Anthropologie de Paris 1893, p. 347—402

(Platyrrhine), having average nasal index 51.97 and 49.60 in male & female respectively. The incidence of long fine nose *i.e.* leptorrhine and very broad noses (hyperplatyrrhine) was also in evidence among them. The occurrence of medium type (mesene) of superior facial index was the predominating feature of both male & female the percentages being 61.11 and 45.46 respectively. Whereas leptene or long face among male (22.22%) and euryene or broad face among female (36.36%) were also high. The percentages of mesosem & megasem classes of transfrontoparietal indices were found to be highest among the male and female respectively, while the incidence of microsem & hypermegasem was also there. Though the medium height or mesoconchic type of orbit was the dominating feature among both sexes, the average orbital index being 82.55 (Rt.) 83.01 (Lt.) in male and 84.91 (Rt.), 87.36 (Lt.) in female, but the presence of chamaeconchic in male (21.88%) and hypsiconchic type of orbit in female (52.17%) is more prevalent.

Among both the sexes the character of maxilloalveolar index was brachyuranisch* but the presence of mesuranisch type among male (18.18%) and dolichuranisch type among female (30.43%) was dominant. Brachystaphylin* class of palatal index, was the highest among male(56.52%) while leptostaphylin and mesostaphylin types were evenly distributed among both sexes. The majority of cranial capacity* were euencephal among both male (1301—1450 ccm.) and female (1151—1300 ccm.) while the incidence of oligencephal and aristencephal among both male (1451—xccm.) and female (1301—xccm.) was equally high. Mesognathous[20] (80°0—84°.9) or medium type of facial protrusion, estimated from the degrees of angles on craniograms, was in highest percentage among both the sexes, while the presence of orthognathous type (85°.0—92°.9) was evenly distributed among both male and female. But it is interesting to note that the degree of facial prognathism (70°.0—79°.9) was comparatively higher in female than in male. The percentage of mesognathous type of alveolar prognathism (80°.0—84°.9) was comparatively higher in male than in female. While the occurrence of orthognathous type (85°.0—92°.9) was almost equal among both sexes. The presence of hyperprognathism (60°.0—69.°9) and hyperorthognathism (93.°—x) was comparatively higher in male than in female, the percentage being 12.0 and 5.88 in male and female respectively.

It was interesting to note that the tall statured people of Harappa possessed long head *i.e.* dolichocranial type, associated with either very flat (hyperplatyrrhine) or long (leptorrhine) nose. The presence of leptorrnine nose was more prevalent in female than in male. Short statured people possessed either very long head (hyperdolichocranial) or medium head mesocranial type, associated with platyrrhine or leptorrhine nose. Harappa people were basically either of long headed or medium headed type apart from a few broad headed or brachycranial individual, particularly found in cemetery H. Jar burial and Mound AB area.

In table Nos 1 & 2 an attempt was made to analyse the comparative values of frequencies and percentages of different cranial, facial, nasal, orbital, maxilloalveolar and palatal characters as well as degrees of facial prognathism of the crania, excavated from different stratifications and sites of Harappa.

It was interesting to note from tables 1 & 2 that in Cemetery H, open burial, 25.0% of male was hyperdolichocrania whereas in Cemetery H, jar burial 16.67% of male possessed such character. In Cemetery R. 37, 31.25% of male & 33.33% of female possessed hyperdolichocranial type. This character was absent in Mound AB. In area G, 40% male and 50% female possessed dolichocrania whereas 25% male and 25% female possessed the same type of crania in Cemetery H, open burial. It should be remarked that 66.67% female skulls possessed dolichocranial type while the same type was absent among the male members. In Cemetery R. 37 dolichocranial type was present among 50% male and female skulls. In Mound AB only one male skull was possessing dolichocranial type while two female skulls were found in the same area—one having dolichocrania and the other was brachycrania. It was interesting to observe that 60% of the male and 50% of the female possessed mesocranial type in Area G, while 50% male and 75% female possessed the same character in Cemetery H, open burial. In cemetery H, jar burial, it was observed that 66.67 p.c. of male and 20.0 p.c. of female possessed mesocranial type. But in Cemetery R. 37 it was noticed that only 18.75 p.c. of male and 16.67 p.c. of female possessed mesocranial type, while the same character was not in evidence in Mound AB area. It should be remarked that one individual of Cemetery H, jar burial and one of Mound AB possessed brachycranial type.

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*20. Martin R. & Saller K. 1956 —Lehrbuch der Anthropologie, pp. 470, 482, 485 & pp. 488—499.

The majority of the male skulls of the Area G, of Cemetery H, open burial, of Cemetery H, jar burial, of Cemetery R. 37 and of Mound AB possessed orthocranial type of length height index. Among female skulls chamaecranial type was predominating in Cemetery H, jar burial and in Cemetery R. 37, while in the case of other strata, viz., Area G, Cemetery H, open burial and in Mound AB, orthocranial type was in the highest percentage. The percentage of the hypsicranial type was also appreciable among male and female individuals of the Area G, Cemetery H, open burial, Cemetery H, jar burial, Cemetery R. 37 and in Mound AB.

Tapeino cranial skulls were present only in Cemetery R. 37 and in Mound AB area among both the sexes. The frequency of the occurrence being one in each sex, but the highest percentage of the skull possessed acrocranial type in all other strata except area G and in Mound AB in the case of the former metriocranial type predominated in both the sexes while in the case of the later the occurrence was only one in each sex.

It was interesting to note that mesene type of superior facial character was predominated in area G, Cemetery H, open burial, Cemetery R. 37 and in Mound AB, in both the sexes except the female skull of area G where leptene type was in the highest percentage. In Cemetery H, jar burial, among the male skulls leptene type predominated but in Cemetery R. 37 this character was present in the highest percentage among the female. In Cemetery H, open and jar burial only two individuals possessed hyperleptene facial character.

Only one male individual of Cemetery H, open burial was found possessing microsem type of transverse-fronto-parietal index while the majority of both male and female possessed mesosem type in other strata. The percentage of the megasem was also equally high among them particularly among the male members of Cemetery H, jar burial. Hypermegasem was also present among the male member of area G and Cemetery R. 37 and also among the female members of Cemetery H, jar burial and Cemetery R. 37.

The highest percentage of the orbital character was mesoconch among the male members of area G, Cemetery H, open burial, Cemetery H, jar burial, Cemetery R. 37 and in Mound AB. Mesoconch was also present among the female members of the area G, Cemetery H, jar burial, Cemetery R. 37 and in Mound AB. The majority of the orbital character of the female were hypsiconch in different areas.

Leptorrhine nose was present among two female members of Area G, in one individual of Cemetery H, open burial, four individuals of Cemetery R. 37 and in one individual of Mound AB. Leptorrhine character was also present in one male member of Cemetery H, open burial and in five individuals of Cemetery R. 37. Considerably high percentage of the people possessed chamaerrhine type of nose, the occurrence was particularly high among the male members of area G, and Cemetery R. 37. Among the female members also the percentage of chamaerrhine type of nose was appreciably high, particularly among the people of Cemetery H, open burial, Cemetery H, jar burial and in Cemetery R. 37.

It is interesting to note that brachyuranisch type of the maxillo-alveolar index was the characteristic of male skull of the area G, whereas dolichuranisch and brachyuranisch types were evenly distributed among the female members. In Cemetery H, open burial, four male individuals were found possessing brachyuranisch type and two members possessed mesuranisch type but in the case of the female members it was noticed that one possessed brachyuranisch and another possessed dolichuranisch type. Two male members of the Cemetery H, jar burial possessed brachyuranisch type but in female skull the presence of mesuranisch was noted in one skull and brachyuranisch type in another skull. It should be remarked that dolichuranisch, mesuranisch and brachyuranisch types were present in male skulls of Cemetery R. 37 and the frequency was 3, 1 and 3 respectively. In female skulls also all the afore-mentioned characters were present but the frequency was 3, 1 and 7 of dolichuranisch, mesuranisch and brachyuranisch respectively. One male member of Mound AB possessed dolichuranisch type, whereas, one female member possessed brachyuranisch type.

Brachy staphylin type of palatal character was present in three male skulls while leptostaphylin type was noted in two other male members of the area G, but in the case of the female skulls one member possessed leptostaphylin and three members of the same area possessed brachystaphylin type. One male member of Cemetry H, open burial possessed mesostaphylin type whereas five individuals of the same area possessed brachystaphylin character. Among the female skulls the frequency of brachystaphylin was three, while the frequency of leptostaphylin was one. The presence of mesostayphylin was observed in one male member and brachystaphylin type in another of Cemetery H, jar burial, whereas, among the female members the occurrence of leptostaphylin, mesostayphylin and brachystaphylin types were noted and the frequency being 1, 1 and two respectively. It is interesting to note that leptostaphylin, mesostayphylin and brachystaphylin characters were evenly distributed among the male members of Cemetery R. 37 and the frequency was two. All the characters noted above were also present among the female members but the frequency in the case of leptostaphylin was 2 and that of mesostaphylin and brachystaphylin were three and eight respectively. Leptostaphylin was present in one male member of Mound AB while the palatal character of the female member was brachystaphylin the frequency being one.

It should be remarked that the cranial capacity of the male of the area G was grouped under oligencephal, euencephal, and aristencephal and the frequency being 1, 2 and 2 respectively. Among the female members the presence of all the characters mentioned above was also noticed and the frequency being 1, 2 and 1 respectively.

Among the male members of the Cemetery H, open burial one individual possessed oligencephal and the occurrence of euencephal and aristencephal was also noticed and the frequency was one in each case. Two female skulls were grouped under aristencephal but the occurrence of oligencephal and euencephal was also there and the frequency being one in each grouping. In Cemetery H, jar burial the majority of the skulls were euencephal but the presence of oligencephal and aristencephal was also there, the frequency being one in each case. Among the female members two individuals were grouped under oligencephal and two other members were classed under euencephal. It was very interesting to note that nine male members of the Cemetery R. 37 were grouped under euencephal and four members were classified under aristencephal and the presence of oligencephal was also there the frequency being two. Seven female members of the Cemetery R. 37 were also grouped under euencephal and four members were included under aristencephal and one was included under oligencephal. One male and one female skulls were grouped under euencephal and oligencephal respectively.

The facial character of the male member of the Area G was either mesognathic or orthognathic type—the frequency being 2 and 1 respectively. But two female members of the same area were noted possessing prognathic face ; mesognathic and orthognathic type were also present among the female members—having frequency one in each type.

In Cemetery H, open burial one male individual was observed possessing prognathic type of facial character. Mesognathic type was in the highest percentage in that area and the frequency being three, one individual was noted possessing orthognathic type. In the same area one female member possessed mesognathic type and another orthognatic character

In Cemetry H, jar burial two male individuals possessed mesognathic type while in the same area another member possessed orthognathic character. Prognathic face was noted among two female members and mesognathic type was also present among them—the frequency being two. It was interesting to note that no male member of the Cemetery R. 37 possessed prognathic face while the highest percentage of the people of that area was noted possessing mesognathic type—the frequency being four and two individuals possessed orthognathic character in the same area. One female member of the Cemetery R. 37 was noted having prognathic facial character but the highest percentage of the female member of that area possessed mesognathic type,—frequency being three and in the same area two members were observed having orthognathous type of facial protrusion. It was not possible to note the facial character of the people of Mound AB due to absence of anatomical landmark.

The analysis of the distinctive features of crania excavated from different stratifications and sites enabled us to formulate the presence of the following Racial types among Harappa people :—

1) Large headed Rugged dolichocranial type akin to Proto-Nordic (vide plate I)

This type is characterised by very tall stature (1837 mm.), large and long head, high cranial vault, strong brow ridges, large mastoid and heavy rugged muscular features. The character of face is relatively long or moderately broad along with well marked glabella. The character of nose is relatively broad while the orbits are squarish & mesoconchic (0.1.82.03—80.25) in type. This type is comparatively more akin to Proto-Nordic type of Tepe Hissar III, Phoenician skull (13th century B.C.—vide plate VI), Dixon's Caspian type, Palmyra skull of Palestine, Indo-Aryan (Kapper) and post Harappan skull of Lothal.

This type is represented in skull Nos H.P. XXVI skl-1, H.P. XXVI skl-2, and H. 794 which were excavated from Cemetery R. 37 of Harappa. Comparatively less rugged variety of this Proto-Nordic type (vide plate II) was in evidence in Harappa skull Nos H. 699, H. 796/B, H.P. XXIX skl-10, G. III s. 23, H. 698 and H. 247 (a) which were excavated from Cemetery R. 37 and Cemetery H, open burial of Harappa. The salient features of this type were also long head, *i.e.*, dolichocranial type associated with well arched narrow vault and comparatively finer feature and more receding forehead than the large headed rugged type. The supraorbital ridges are moderately marked and the face is relatively long & narrow in association with well marked chin. The character of nose is comparatively finer & high varied from lepto to chamaerrhinic types (N. I. 46.15—62.92). While the orbits are relatively round chamaeconchic to hypsiconchic (O. I. 52.85—92.50) in type.

2) Small smooth dolichocranial type akin to Proto-Mediterranean or Mediterranean type (vide plate III)

This type is represented in skull Nos H. 805, H. 488, H. 793/B, H. 817, H. 206 (d), G. IIIs. 21, G. IIIs. 47, G. IIs. 42 & H.P. XXXII pot 11, which were excavated from cemetery H open & Jar burial, cemetery R. 37, & area G site of Harappa. The characteristic features of this type are long head, *i.e.*, dolichocranial (C.I. 65.95—77.84) or medium headed (mesocranial) type associated with moderately high vault and well arched contour with protruding occiput (occiput en chignon) appearing to be smooth and gracile in out-look. The face is relatively long and short. The character of forehead is vertical along with moderately marked brow ridges. The character of nose is relatively short,—lepto to mesorrhinic (N. I. 45.65—51.06) in type and the orbits are relatively short medium and squarish in shape. The type is more comparable to Proto-Mediterranean type of Chanhu-daro, Mediterranean type of Mohenjo-daro, Alishar, Ur, Tepe Hissar III and of post Harappan skull of Lothal and also of Nipor skull of Baghdad & Iraq (vide plate VII & VIII).

3) Alpino-Armenoid type (vide plate IV)

The characteristic features of this type are either Broad headed, *i.e.*, Brachycranial or mediumheaded (mesocranial) type associated with broad face, round chin and relatively globular shaped cranial vault. The forehead is relatively high and supraorbital ridges are moderately marked and the occiput is relatively flat (plano-occiput) particularly observed in skull No. H. 11635. The character of nose is comparatively short and flat varied from lepto to platyrrhine in type while the orbits are round and high—meso to hypsichonchic type. This type is more akin to the Alpine, Alpino-Armenoid type of Altai Telengete (Reicher), broad headed type of Mohenjo-daro and Alpino-Armenoid type of Lothal. (vide plate IX) Alpine & Armenoid types are particularly present in skull Nos. H. 245E, H. 11635 and 5440D, Mound AB which were excavated from Cemetery H, jar burial and Mound AB area of Harappa.

4) Low headed dolicho to mesocranial type bearing primitive features akin to Veddoid or Australoid type (vide plate V)

The characteristic features of this type are low head varied from hyper-dolicho to mesocranial type (C.I. 67.68—79.89) associated with low retreating forehead, marked supraorbital ridges and relatively broad flat nose varied from mesorrhine to hyper platyrrhine in types (N.I. 49.02—58.33) with well marked depressed nasal root. The orbits are relatively low & short variable in types. The presence of these characters was observed in skull Nos H. 255 (a), H.

820 (III), H. 344, H. 793/A, & G. IIs. 18 which were excavated from Cemetery H. jar burial, Cemetery R. 37 and Area G site of Harappa. The type is comparatively more akin to the Veddoid or Australoid type. These racial types supported to a certain extent Guha's contention of the prevalent racial types present at Harappa on the basis of available cranial material.

In the following tables No. 3, 4, 5 & 6 the mean values of different cranial, facial, nasal and orbital measurements and their indices of adult male and female Harappa crania were compared with those of Pre and Proto-historic crania of India, West Pakistan and Western Asia, etc. *viz*, Ur., Alishar, Kish, Nal etc. Positive and negative signs indicate the nature of deviation from the mean values of the pooled series of Harappa crania.

It would appear from the comparative tables Nos 3, 4, 5 & 6 that close affinity was in evidence in the mean value of the maximum cranial length of the Harappa male when compared with the mean values of the following pre-historic skulls, *viz.*, Kish—3.86, Alishar (Copper Age) —1.8, Anau—1.03, Shah Tepe—4.60, Hissar III (Mediterranean)—2.28, Egypt Naqada—1.16, Egypt Badari—1.47, Sakkara—2.93, Sedment+2.07, Kerma—1.24, Palestine Megiddo (Chalcolithic)—6.53, Palestine Megiddo (Bronze)—2.03, Palmyra—2.50, Crete—2.43, Greece Neolithic Early Helladic—1.13, N.E. Balkans Bulgaria Beessarabia (Chalcolithic), +1.74 Armenia—5.73, Yabrud+3.37, Mohenjo-daro+2.16, Bayana+5.97, Chanhu-daro+5.97, Maski—2.03, Nal—4.54, Taxila—5.33, Adittanallur —1.89, and Lothal+4.30. Very little difference was present in the mean value of the maximum cranial length of the Harappa female, skull when compared with the following skulls, *viz.* Alishar (Chalcolithic)+1.36, Alishar (Copper Age)+0.64, Kerma (Egypt 12th—13th Dynasty)—0.4, Sialkot+2.36 Lothal—2.36 and in the case of other skulls mentioned above female data were not available for comparison. Close affinity in the mean value of the maximum cranial breadth of the Harappa male was present when compared with the mean values of the following prehistoric skulls, *viz.* Ur—0.22, Al-Ubaid—5.32, Kish—1.67, Alishar (Copper)—0.22, Troy—3.52, Sialk—0.5, Shah-Tepe—4.65, Hissar (Proto Nordic)—1.17, Hissar (Mediterranean)+1.66, Egypt Predynastic Naqada—0.09, Egypt Badari—3.18, Sakkara—3.92, Sedment—3.52, Kerma+1.18, Bayana+7.78, Maski—2.22, Nal+2.78, Addittanallur—4.22, Lothal+4.30, Palestine (Chalcolithc)—0.39, Palestine Palmyra—3.32, Crete—2.02, Greece (Neolithic)—4.92, N.E. Balkans Bulgaria Bessarabia—3.72, Armenia—3.02, & Yabrud—0.72.

Only in the case of a few skull the mean values of the maximum cranial breadth of the female skulls were available for comparison, *viz*, Ur—1.61, Alishar (Chalcolithic)—0.11, Kerma—0.09, Sialkot—1.89, & Adittanallur—1.89. The mean value of the auricular height of the male Harappa skulls shows the existance of a very close relation with the following prehistoric skulls, *viz.* Ur+2.73, Troy+3.62, Sialk—4.42 Shah Tepe—3.42, Hissar Proto-Nordic—4.67 Hissar Meditterranean+0.88, Egypt Naqada+2.01, Egypt Badari—2.12, Sakkara—1.22, Sedment —1.72, Kerma—2.88, Mohenjo-daro+2.58, Adittanallur+3.75, Lapithos Melia Enkomi+3.87, and Early Helladic+3.82. The mean value of this character of the Harappa female is very close with that of Kerma+2.4. It should be remarked that except Ur, Sialkot and Adittanallur data on female skull were not available.

The mean value of the basion bregmatic height of the Harappa male has got close relation with the following skulls, *viz*, Al-Ubaid—4.12 Kish+0.20, Alishar Copper Age—4.02, Hissar Meditteranean+0.55. Naqada+1.83, Badari—1.72, Sakkara—3.02, Sedment—5.02 Kerma +1.02, Mohenjo-daro+0.62, Bayana+2.38, Taxila—2.38, Adittanallur+1.12, Palestine Megiddo (Chalcolithic)—0·38, Crete—2.18, East Cyprus Lapithos Melia Enkomi+4.34, Early

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Helladic+3.32, N. E. Balkans+2.17, & Armenia−0.68, Close relation in this character of the female was also in existance with these skulls, *viz.* Kerma+0.7 & Adittanallur−0.05.

The mean value of the nasion basion line of the Harappa male approaches to the mean of these skulls, *viz.* Kish−5.30, Hissar III Mediterranean—2.34, Egypt predynastic Naqada−1.01, Badari+1.97, Sakkara+1.83, Sedment+2.33, Chanhu-daro−4.33, Nal−0.67, Taxila−4.67, Adittanallur+3.67. Lothal—0.33, Palestine Megiddo (Chalcolithic)+3.67. Palmyra+0.87, Crete +1.67, E. Cyprus Lapithos Melia Enkomi+1.34 & Early Helladic+2.47. The mean value of this character of the female Harappa differs from Adittanalur female by −4.52 mm.

Close relation in the mean value of the minimum frontal breadth of Harappa male was in existence with the following skulls, *viz.*, Ur−1.97, Al-Ubaid−1.30 Kish−0.74, Alishar (Copper)+4.40, Troy value nil, Sialk+0.87, Shah Tepe+0.03, Hissar III (Proto Nordic)−1.51, Hissar III Mediterranean−1.19, Naqada−4.64, Badari−4.60, Sakkara+0.80, Sedment−3.10, Kerma+2.90, Mohenjo-daro+5.86, Bayana+5.70, Chanhu-daro−1.30, Maski−1.70, Nal −2.70, Taxila+0.30, Adittanallur+0.70, Lothal−2.97, Palestine Megiddo (Chalcolithic)+1.55, Megiddo (Bronze)−4.10, E. Cyprus Lapithos Melia Enkomi−2.02. Early Helladic+0.60, skull from North Balkans−0.61, and Armenia−3.50, Close relation in this character of the Harappa female was present in the following skulls, *viz.* Alishar (Chalcolithic)+1.50, Alishar (Copper) +1.00, Kerma+3.30, Sialkot−5.50, Adittanallur−5.50. In the mean value of the maximum bizygomatic breadth of Harappa male close affinity was observed when compared with the following skulls, *viz.* Ur−1.02, Al-Ubaid−3.71, Kish+4.75, Troy−3.51, Sialk+2.69, Hissar (Proto-Nordic)—1.28, Naqada—5.68, Sakkara+3.51, Sedment+4.11, Kerma+3.81, Bayana+ 5.31, Adittanallur−5.31, Palestine Megiddo (Chalcolithic)+0.69, Skull from N. E. Balkans (Chalcolithic)+3.35, Armenia−0.91, Ukraine−3.19. In the case of the female skull appreciable difference was not present in the following skulls, *viz.*, Ur+1.31, Alishar (Chalcolithic)+5.71. Appreciable difference in the mean value of the bigonial breadth of the Harappa male was not present when compared with the following skulls, *viz.* Sialk−4.40, Hissar III (Mediterranean)− 6.00, Badari−0.20, Sedment−3.00, and Early Helladic−4.70. It should be remarked that in the case of the majority of female skulls comparative measurement were not available.

Close affinity was noticed in the mean value of superior facial height of the Harappa male when compared with those of the following skulls, *viz.* Al-Ubaid−3.60, Kish−3.60, Alishar (Copper)−1.2, Troy+1.20, Sialk−6.60, Hissar (Mediterranean)+0.74, Naqada−0.81, Badari −1.30, Sakkara−3.50, Sedment+3.10, Mohenjo-daro−3.44, Nal+3.60, Palestine Megiddo (Bronze)+0.60, Palmyra−2.60, Crete−3.40, E. Cyprus Lapithos Melia Enkomi−0.92. Early Helladic+1.80, N. E. Balkans Bulgaria Bessarabia (Chalcolithic)−1.80, Armenia+1.60, Ukraine+0.20, and Yabrud−1.40. Close affinity in the mean value of this character was in existence when compared with those of female skulls, *viz.* Ur—0.58, Alishar (Chalcolithic)+2.40.

The mean value of the nasal height of the Harappa male when compared with those of the following skulls a close relation is also in evidence viz. Ur+3.53, Al-Ubaid+2.86, Kish+4.66, Alishar (Copper Age)−2.34, Troy−1.14, Sialk+3.46, Shah-Tepe −2.14, Hissar (Proto-Nordic)+0.07, Hissar (Mediterranean)−0.64, Egypt-Predynastic−0.44, Badari+2.74 Sakkara+0.06, Sedment+0.26, Kerma−1.14, Mohenjo-daro−4.71, Chanhu-daro−2.64, Taxila +3.86, Adittanallur−0.14, Palestine Megiddo (Bronze)−0.97, Palmyra +0.94, Crete+2.24, E. Cyprus Lapithos Melia Enkomi+1.17, Early Helladic−0.94, N.E. Balkans Bessarabia (Chalcolithic)−2.33, Armenia+1.36 and Yabrud−2.14. The mean nasal height of the female when compared with the female skulls close relation was noticed in the case of the following, *viz.* Ur−2.32, Alishar (Chalacolithic)+2.32, Kerma+1.22, and Adittanallur

—1.32. In the majority of the female skulls the mean values of the nasal height were not available. Close affinity in the mean values of the nasal breadth of the Harappa male skulls was in evidence when compared with the following pre-historic skulls, *viz.* Ur—0.33, Al-Ubaid +0.64, Kish+2.51, Alishar (Copper Age)+1.44, Troy+2.74, Sialk+2.74, Shah Tepe—3.34, Hissar (Proto-Nordic)+1.03, Hissar (Mediterranean)—1.72, Egypt Predynastc Naqada —1.42, Badari—1.74, Sakkara—1.14, Sedment+2.0, Kerma—0.74, Mohenjo-daro—4.34, Chanhu-daro—2.54, Nal—3.34, Taxila—2.34, Adittanallur—1.34, Lothal+0.34, Palestine Megiddo (Bronze Age)—0.67, Palmyra—2.84, Crete—2.14, E. Cyprus, Lapithos Melia Enkomi (Bronze) —2.26, Early Helladic—2.34, N.E. Balkans Bulgaria Beessarabia—2.62, Armenia—2.64, and Yabrud—2.84. Very little difference was noticed in the mean values of the nasal breadth of the Harappa female skull when compared with the mean of the following, *viz.* Ur+0.21, Alishar (Chalcolithic)+2.54, Kerma+0.96, and Adittanallur+2.96. In other case the mean value of the female skull was not available for comparison.

Close affinity in the mean values of the orbital breadth of the Harappa male was observed when compared with the mean of the following skulls, *viz.*, Ur+1.14, Al-Ubaid+1.14, Kish +0.29, Alishar (Copper Age)+2.24, Troy+2.84, Sialk+1.14, Shah-Tepe+4.14, Hissar (Proto-Nordic)+1.63, Hissar (Mediterranean)+2.24, Naqada+2.04, Badari—2.74, Sakkara+2.24, Sedment+1.44, Kerma+0.36, Mohenjo-daro—3.74, Chanhu-daro—1.86, Maski+1.86, Nal—1.14, Adittanallur—0.14, Lothal—1.11, Palestine Megiddo—2.81, Crete—1.64, E.Cyprus Lapithos Melia Enkomi—1.86, Early Helladic—2.34, N. E. Balkans Bulgaria Beessarabia—2.39 and Armenia—0.94. The average orbital breadth of the Harappa female when compared with the available material of the female skulls the following results were obtained, *viz.* Ur+0.49, Alishar (Chalcolithic)—0.51, Alishar (Copper Age)—1.51, Kerma+1.19 and Adittanallur+1.49.

The mean value of the orbital height of the Harappa male crania when compared with the mean values of the following skulls viz. Ur, Al-Ubaid, Kish, Alishar (copper Age), Anau, Troy, Sialk, Shah-Tepe, Hissar (Proto-Nordic), Hissar (Mediterranean), Naqada, Badari, Sedment, Kerma, Mohenjo-daro, Chanhu-daro, Nal, Adittanallur, Lothal, Palestine, Megiddo Palmyra, Crete, E. Cyprus, (Bronze Age), Lapithos Melia Enkomi, Early Helladic (Greece), N. E. Balkans Bulgaria Bessarabia, & Armenia (Sevan) appreciable dfferences were not found. The mean value of the orbital height of the Harappa female crania is higher than that of the Ur, Alishar (Copper), Kerma, and Adittanalur, but the mean value is less than that of the Alishar (Chalcolithic) and the respective differences are 2.32, 2.64, 1.14, 1.64 and 1.36.

Close affinity was also noticed in the mean value of the horizontal cranial circumference of the Harappa male skull, when compared with those of the following skulls viz. Kish+0.52, Troy+7.13, Sialk+6.33, Shah-Tepe+6.83, Hissar III (Proto-Nordic)—0.21, Hissar III (Mediterranean)—13.05, Naqada—11.65, Sakkara—4.87, Sedment—11.97, Kerma—13.47, Nal—4.33 Taxila+6.83, Adittanallur—6.67, Crete—7.77, E. Cyprus Lapithos Melia Enkomi —12.80, Greece early Helladic—8.97, N. E. Balkans Bulgaria Bessarabia—2.79, and Armenia+5.13. The mean values of the horizontal circumference of the female Harappa skull approached very closely to that of the Kerma—9.96, and Adittanallur—0.86 but in case of other skulls data were not available.

The average cranial capacity of the male Harappa crania approached to those of the following skulls, *viz.* Ur+24.54, Kish+28.04, Anau—10.86, Mohenjo-daro—56.46, Sialkot +28.96, Nal+54.24 and in other skulls the mean value of the cranial capacity was not available. In case of Harappa female skull the mean value of the cranial capacity is less than that of the Ur and Sialkot by+39.92 & +127.92 respectively.

Close affinity in the mean value of the cranial index of the Harappa male skull was observed when compared with the averages of the following prehistoric skulls, *viz.*, Ur+3.29, Al-Ubaid +0.42, Kish−0.23, Alishar−1.11, Anau−3.12, Troy−0.59, Sialk−4.31, Shah-Tepe+0.81, Hissar III (Proto-Nordic)−2.24, Hissar III (Mediterranean)−1.44, Naqada−0.10, Badari−0.99, Sakkara−1.11, Sedment+3.01, Kerma−0.89, Mohenjo-daro+2.55, Bayana+1.79, Chanhudaro +2.07, Lothal −4.27, Maski +0.51, Nal+3.07, Taxila+2.27, Adittanallur+3.19, Palestine Megiddo (Chalcolithic)−2.07, Palestine (Bronze Age)+3.80, Palestine Palmyra+0.51, Crete +0.31, Greece (Early Helladic)+2.71, N.E. Balkans Bulgaria Bessarabia+2.72, Armenia−0.11, Ukraine−0.91 and Yabrud+1.71.

Only in the case of three female skulls the mean was available for comparison, *viz.*, Ur+2.57, Alishar (Chalcolithic)−1.80, Kerma+.01. Close affinity in the mean value of the length height index of the male Harappa was observed when compared with the mean of the following prehistoric skulls, *viz.*, Ur+0.78, Al-Ubaid +1.04,Kish+1.25, Alishar (Copper)+3.26, Troy−0.24, Hissar (Proto-Nordic)+0.32, Hissar (Mediterranean)−0.05, Naqada+0.66, Bardari+1.86, Sakkara+0.96, Sedment+3.66, Kerma+0.56, Mohenjo-daro+1.91, Lothal−2.53, Bayana+1.76, Chanhu-daro−2.74, Nal+5.61, Addittanallur−0.97, Palestine Megiddo (Bronze)+2.94, Palmyra−5.64, Crete−1.94, Early Helladic+1.66, N. E. Balkans Bulgaria Beessarabia+1.74, Armenia−1.94, Ukaraine (Bronze Age)+1.68 and Yabrud (North Palestine)+0.46. Only in the case of three female skulls the mean value of the length height index was available for comparison with the female Harappa data and the results obtained were as follows : Ur+0.53, Kerma +0.23, Sialkot−5.61. Close affinity in the mean value of the superior facial index of the male Harappa was observed when compared with the mean values of the following skulls, *viz.* Ur−5.05, Al-Ubaid−3.50, Kish−2.38, Alishar+3.07, Troy+0.47, Sialk+2.45, Hissar+1.86, Naqada +0.87, Badari+1.36, Sakkara+3.37, Sedment+3.27, Kerma−1.60, Mohenjo-daro+0.28 Lothal+.07, Channu-daro−3.,90, Palestine Megiddo Bronze−3.42, Palmyra+4.57, Crete+0.17, E. Cyprus Lapithos Melia Enkomi−0.48, Early Helladic−0.98, N.E. Balkans Bulgaria Bessarabia−0.88, Armenia+2.57, and Ukraine−1.93. In the case of the female only three comparative data on this character were available which showed the difference was as follows : Ur−1.24, Alishar (Chalcolithic)−2.20, & Kerma−4.70,

Little difference was present in the mean value of the cranio-facial index of the Harappa male when compared with the mean values of the following pre-historic skulls, *viz.*, Al-Ubaid−1.19, Kish+5.52, Troy+4.97, Sialk+1.71, Hissar III (Proto-Nordic)−2.58, Hissar III (Mediterranean)+3.58, Naqada−4.14, Badari−5.12, Chanhu-daro−0.25, Palestine Megiddo (Chalcolithic)−1.21, Palestine Megiddo (Bronze)−0.41, N. E. Balkans Bulgaria Bessarabia −5.88, Armenia+3.57 and Ukraine (Bronze Age)−3.15 .

In the case of the female skull only the mean values of two skulls were available and the differences are as follows : Alishar (Chalcolithic)+2.67 and Alishar (Copper) −10.23. Close affinity in the mean value of the nasal index of the Harappa was in existance when compared with mean values of the following skulls, *viz.*, Ur−3.10, Al-Ubaid+4.28, Alishar (Copper Age)−0.57, Troy−4.87, Sialk−3.65, Hissar III (Proto-Nordic)−2.00, Naqada−0.79, Badari−0.27, Sakkara+2.37, Sedment−4.17, Kerma−0.27, Mohenjo-daro−2.87, Chanhu-daro −0.32, Nal−4.93, Palestine Megiddo (Bronze)−0.26, Palmyra−4.97, Crete−2.47, E. Cyprus Lapithos Melia Enkomi−3.58, Early Helladic−3.87, N.E. Balkans Bulgaria Beessarabia (Chalcolithic)−3.18, Ukraine (Bronze)−1.47, and Yabrud−3.77. The mean value of the nasal index of the Harappa female was compared with those of only three available data and the differences were as follows—Ur+2.57, Alishar (Chalcolithic)−1.80 and Kerma+3.60. In other characters, *viz.*, orbital index, breadth height index, zygomatico-frontal index and frontoparietal index appreciable difference was not observed.

The mean values of the cranio-facial measurements and indices of different racial types, *viz.*, Proto-Nordic, Mediterranean, Alpine-Armenoid and low headed dolicho-mesocranial type of Harappa crania, (vide tables 7, 8, 9 & 10) when compared with similar Racial types of pre and proto-historic crania of India and abroad, evidence of close affinity was also noticed among them. Presence of slight difference noticed in the mean values of measurements and indices of certain characters may be attributed to personal equation, technique followed, enviromental factors and degrees of miscegenation and inbreeding present among them.

It may be remarked that the large long headed rugged type of people represented at Harappa was very close to the present day people of Punjab and to the Proto-Nordics. The movement of this rugged long headed people—similar to some of the people of Indus Valley civilization, particularly of Mohenjo-daro & Harappa might have been started at the close of the third or beginning of second millennum B.C. On the basis of linguistic & cultural grounds they have been variously ascribed as Aryan, Indo-Iranian or Indo-European people who were originally the long headed Proto-Nordic,—the area of their civilization was said to be Aral-Caspian basin. About the migration of these people several attempts were made to formulate different racial & cultural theories on the basis of their cultures & study of the skeletal materials of the excavated finds.

Myres[21] believed that they came to Asia Minor from West crossing the straits. While Ungnad[22] remarked that a second Indo-European migration following the other one came from the east probably from people that lived about 2000 B.C. in Iran. These were Indo-Aryans who conquered Babylon. Bilabel[23] also supported that Indo-Aryan migration came from the east and that this was the most Western Asiatic offshoot of that large Manda or Mada migration the other branch of which seems to have gone to Mesopotamia. On the basis of cranial indices and some general features of the Damghan skulls Kappers[24] remarked that there was no doubt that the Caspian people was present in ancient Indo-Aryan stock whose present representatives are still found among the Turkmenians, the Baltis and the Punjabis. The oldest dolichocephalic Kurgan people of Russia was probably the later branch of the same race. On the basis of comparative curves of cranial indices he further observed that the main body of the curve runs exactly parallel to the Caspian curve and the highest peaks of both curves coincide with the peak of Neolithic Aryan skulls from Central Europe (Bohemia and Silesia) which were recorded by Reche, Stocky and Schliz. Dolichocephalic group occurring among the Turkmenians steppe where they were mixed with the mesocephalic Iranians. They were numerous in the Indus Valley where they were supposed to have arrived about the middle of the second millennium B.C. Schmidt excavated a site near the Caspian Sea & unearthed several skulls along with other finds which he called Indo-Aryans on the basis of craniometric measurements which were measured by Kappers. The approximate date of the finds estimated from about 3500 to 1500 B.C.

According to Ujfalvy[25] the Baltis together with the Dardous were the purest representatives of those Aryans who were originating from Aral-Caspian Sakians, passed the narrows of

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21. Myres J. L. 1924 —The dawn of History, p. 51
22. Ungnad A. 1933, Die altesten volkerwanderugen Vorderasiens Kulturfragen, Breslau,
23. Bilabel F. 1927—Geschichte Vorderasiens und Aegyptens, vom 16, Bnd. III, p. 137
24. Kappers C. U. A. & Parr W. Leland 1934—An introduction to the Anthropology of the Near East in ancient and recent times—pp. 124, 94, 88—129.
25. Ujfalvy K. E von 1896—Les Aryens au Nord et au Sud del' Hindou Kouch, Masson, Paris,—p. 327, 396

the Hindoo Koosh & settled in the valley of the Lower Indus and the Ganges. While Breasted[26] opined that in the third millennium B.C. somewhere along Asiatic stretches of the grassland, North of Caspian, there lived a group of nomads who were called Indo-Europeans. Some of their descendants shifted southwards along the east side of the Caspian and ultimately entered India, while the other group pushed southwestwards reached Babylon and other drifted westwards along the north side of the Black Sea.

On the basis of comparative study of the different cranial measurements particularly of the Sumerian long-headed skulls with those of the ancient Europe, the Punjabis and Pre-dynastic Egyptians from Abydos Keith[27] remarked that the Ur skulls showed some difference with Al-Ubaid crania and in some respects showed a close resemblance to the sample of the Punjabi skulls measured by Charles Havelock.* He also pointed out some Sumerian affinities of Mohenjo-daro skulls with some of the Kish, Ur and Al-Ubaid. Speaking about the racial affinities of the people of India, Guha[28] remarked that from the beginning of the fourth millennium B.C. North Western India seemed to have occupied by a long-headed race with high cranial vault, long face and narrow prominient nose. It was probable that the powerfully built large headed strain found at Mohenjo-daro formed one of the constituents of this race whose advent in India appears to synchronise with the 'Aryan' invasion. On comparing the cranial indices of the Nal & Veddoid skulls, Sewell & Guha+further remarked that the Caspians entered India sporadically before great migration of second millennium B.C. and also in Sumer before the immigration of the Kassites. On studying different stratifications at Harappa Wheeler[29] observed that stratum II of Cemetery H was not only later than R. 37 but subsequent to a deep intervening deposit of potsherds and other debris which showed a considerable alternation of the site between two cultures. The suggestion has been made by him that the Cemetery H intruders may belong to the Aryan invaders, the conventional date for whose first incursion into India was about fifteenth century B.C. Piggot also supported Wheeler's contention and added that there was a sufficient evidence of the arrival of newcomers at Harappa after the main phases of occupation of the city (Piggot S.—Pre-historic India, 1950, p. 231). In this connection it may be mentioned that Marshall[30] pointed out the cultural resemblance of Mohenjo-daro, with those of second Pre-Diluvian culture of Elam and Mesopotamia and the Proto-historic culture of Sumer. Apart from these he added that the cultural intercourse must have gone between Mohenjo-daro, Al-Ubaid, Sumer and the pre-Sargonic graves at Kish and Jamdet Nasr as well as between late Harappa and the first dynasty at Ur. It may be remarked that in the present study of the comparative available materials, a close resemblance in morphological features (vide plate VI) as well as in the mean values of certain cranio-facial measurements & indices (vide table 7) was also in evidence between the Proto-Nordic Rugged type of Harappa crania and the Proto-Nordic type of Tepe Hissar II & III of early Iran & Caspian type of Central Asia.

The comparative mean values of different cranio-facial measurements and indices of Mediterranean type of Harappa crania (*viz.*, adult male skl. No. G.Is. 11, G. IIIs. 47, II. 42, III. 2, H, 793/B, H. 798/B, H. 806 and adult female skl. No. G. IIIs. 21, IIs. 5, H. 805, H. 816, H. 817, H. 798/A, H. 206(d), H. 779(a), H. 488, pot. 11 & H. 806/A) were incorporated in table 8.

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26. Breasted J. H. 1920—The origins of civilization. The Scientific Monthly, Vol X, p. 205
27. Keith Sir A. 1927—Report on the human remains in Ur excavations, Al—Ubaid by H.R. Hall & C.L. Wooley, Vol I, pp. 214-240
28. Guha B. S. Census of India, Vol I, 1931 part III, p. 87
29. Wheeler R. E. M. 1947—Ancient India No. 3, p. 81.
30. Marshall J. H. 1931—Mohenjo-daro and the Indus civilization, London, Vol 1, pp. 102—112

The Mediterranean type of skull which was found in majority at Harappa appeared to have free from Negroid element and contained Proto-Mediterranean, Mediterranean or Caucasic ethnic features. In connection with the presence of the Mediterranean features among the Indus valley people several theories were put fourth by different anthropologists. On the basis of cranial measurements, indices & certain morphological features, particularly low vault, long head, broad face, low orbit, broad nasal aperture, Chanhu-daro skulls was placed with the Proto-Mediterranean type. But long head is not the only characteristic feature of Proto-Mediterranean type nor it is solely an attribute to Caucasic group, it is also the characteristic feature of Negroid type. It appears that Chanuu-daro skull is also dolichoranial, chamaecranial, chamaerrhine and in length-height proportion of the vault and nasal aperture according to Krogman[31] appear to fall under Negroid category. But broad face associated with long head, *i.e.*, disharmonic feature of Chanhu-daro remained unexplained. Further in its cranial, facial measurements & indices and morphological features, Chanhu-daro is attributed to not one single type but is a blend of diverse ethnic features.

Friederichs and Muller[32] on examining Mohenjo-daro cranial measurements remarked that the presence of Hamitic type was there particularly in skull Nos. 6,7 and 19 which were placed as Mediterranean by Sewell & Guha. They also defined the cranial characters of the Hamitic type as dolicho-cranial having moderate to high vault associated with medium to narrow face and nose along with high orbit. In certain Harappa crania such Hamitic characters were in evidence, but it should be remarked that the Hamitic term was more appropriate in cultural and linguistic significance rather than ethnic features. Such types of people are in evidence in South India and are known as Dravidian speaker. The characteristic features of the Hamitic type are dolichocranial to hyperdolichocranial, leptoprosopic to hyperleptoprosopic, lepto to mesorrhine nose, hypsiconchic orbits and non-prognathous face. This type was classified by Sergi[33] as Mediterranean, Hamitic by Poch,[34] the Predynastic by Giuffrida-Ruggeri,[35] the Proto-Egyptian by Elliot Smith,[36] Iranic by Dirr, the Oriental by Fischer, the Nordoide by Lebzelter[37] and the Eastern Mediterranean and Indide by Eickstedt[38]. This type of skull is similar to Aniba skulls reported by Steindorff[39] and Weidenreich[40] from Nubia during the third to second millennium B.C .and Friederich and Muller remarked that similar type of skulls were also found at Kish, Al-Ubaid, Anau and Nal. By studying the affinity of dolichocrania at Mohenjo-daro, Kish, Nal,

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31. Krogman W.M. & Sessaman W.H.—Skull found at Chanhu-daro (Mackay-Chanhu-daro Excavation 1935-36 —p.p. 252-268

* Havelock Charles R.—1892—Craniometry of some of the outcast, tribes of the Panjab (Journ. Anatomy Phy siol. Vol. 26)

+ Sewell R. B.S. & Guha B.S. 1931—Human remains found at Mohenjo-daro (Marshall—Mohenjo-daro and the Indus civilization, Vol II, p. 599-648)

32. Friederichs H. F. and Muller H. W.—1933—Die Rassenelemente im Indus-Tal wahrend des 4 and 3 vorchristlichen Jahrtausends und ihre Verbreitung (Anthropus XXVIII p. 383-406
33. Sergi G. 1901—The Mediterranean Race
34. Poch R. 1920—Osten und Orient, III, Wein, p. 729
35. Giuffrida Ruggeri V. 1917—Systematic Anthropology of Asia, Archivio perl' Anthropologia e. la Ethnologia Firenze, XLVII.
36. Elliot Smith G. 1923—The ancient Egyptians
37. Lebzelter V. 1931—Schadel aus Persien. Ann. naturhistor. Mus. Wien. XLV, p. 137-157
38. Eickstedt E. von 1934—Rassenkunde und Rassengeschichte der Menschheit,—Stuttgart
39. Steindorff G. 1931—Aniba. Altnubiens Hauptstadt Forsch u. Fortschr, VII. pp. 369-370
40. Weidenreich F. 1932—Uber "Oldeway"—Verh des I Internat Kongr f. Pra und fruhgeschichtl. Wissensch, London

Bayana, & Sialkot, Sewell & Guha[41] observed that a close relation was in evidence among them and they placed them to a branch of Mediterranean race but further they remarked that the presence of low vault in Bayana crania may be basically Mediterranean with the possibility of intermixture. On examining the human remains of Alishar, (Chalcolithic & Copper age,) Al-Ubaid and Kish, Krogman[42] further remarked that they were basically of Mediterranean stock. But certain crania of Hissar III which were grouped as Mediterranean possessed one or more trait presumably diagonostic for a Negroid type. One explanation he added in terms of miscegenation which had taken palace definitely with a few type of Negro crania. But Keith[43] on the basis of his study of certain crania from Tarim Basin and Al-Ubaid and of modern racial types of South Arabia remarked that intermediate types really arise by misegenation of two extreme types but represent a stage in evolutionary development which is intermediate beween two extremes. He further added that in this evolutionary sense the Mediterranean type may be related to the Hamitic.

The evidence at our knowledge leads us to infer that the Mediterranean type of people was the earliest contributor of the agriculture and urban civilization of almost whole of Western Indian prehistoric zone and spread over extensive area streaching along Mediterranean basin towards east to Northern India. Some placed the Mediterranean homeland in the region of Eastern Mediterranean and the Black Sea. Pumpelly[44] has brought out the fact as investigated by Sergi that in the second millennium B.C. the people of Mediterranean racial type were living in Anau in Central Asia. Eickstedt remarked that from the last glacial period the Proto-Mediterranean have occupied the south of the Iran-Himalayan region. While Daniloff[45] on studying the data on Persia asserts that the people of Persia were of Mediterranean stock.

The presence of broad headed people, *viz.* Alpine-Armenoid type, had played a very insignificant part in the racial composition of Indus Valley people. This type of people at Harappa might be regarded as later infiltration probably had entered India through north-west from Asia Minor, Iranian and Pamir plateau. As regards movement of these people Hutton[46] put forth a theory that during the third millennium B.C. India was penetrated by some brachycephal immigrants from Iranian and Pamir plateau who spread their culture to the west of Asia. Dixon[47] also states that in the third to second millennium B.C. a Palae-Alpine type entered India from north west. Guha[48] also recognised that an Alpino-Armenoid strain entered India from western Asia. While Coon remarked that brachycephal with flat occiput was resulted due to crossing between Mediterranean and Alpine type. Further he added that the Armenoid type was a stable hybrid between two principal elements, *viz.*, the Alpine Race and the Irano-Afghan division of the Mediterranean stock. On the evidence of

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.41 Sewell R. B.S. & Guha B. S. 1929—Report on bones excavated at Nal. (Mem. Archeol. Surv. of India, No 35. p.p. 56-89)

42. Krogman W. M. —1933—The cranial types at Alishar. In "Alishar Huyuk, seasons 1928-29" by E.F. Schmidt

43. Keith Sir A. 1929—Human skulls from ancient cemeteries in the Tarim Basin (J. Roy. Anthrop. Inst. LIX p.p. 149-180

44. Pumpelly R. 1908—Explorations in Turkestan 1904. Prehistoric civilizations of Anau. Carnegie Inst. Washington, pub. 73

45. Daniloff—Characteristics of the Persians (in Russian)

46. Hutton J. H. 1934—Racial and cultural history of India—C. R. Congres. Int. Sci. Anthrop. Ethnol London p.p. 27-39.

47. Dixon R. B. 1923—The Racial history of Man. New York. pp. 265-66.

48. Guha B. S. 1934 Racial affinities of people of India, Congres Intern des Sci Anthrop. Ethnol, London, pp. 194-195,

method of disposal of the dead Vats[49] remarked that some sudden change in racial as well as cultural upheaval at Harappa was in evidence with the introduction of the jar burial which indicate a considerable gap of time from the earlier epoch of open burial. This contention was further supported by the evidence of a broad headed skull in jar burial at Harappa which may be believed to have introduced by some immigrant people.

According to Sewell & Guha the round headed people at Mohenjo-daro is akin to a Mongoloid branch of Alpine stock rather than an Armenoid origin. Krogman also supports that they were non-Armenoid and states that in dimensions and proportions they appeared to be weakly Mongoloid. Asiatic round headed type usually called Mongoloid was not in evidence at pre-historic crania of Tepe Hissar, except a few mixed type in Hissar III. Buxton & Rice[50] also grouped some skulls at Kish as Armenoid type but they did not trace the presence of Eastern Asiatic Race at Kish. Keith also remarked that no trace of people having Mongoloid affinity was found at Al-Ubaid & Ur. Vallois[51] did not find this type at Tepe Giyan. Fierderichs & Muller on the basis of findinig of such type at Mohenjo-daro assert that it was closely related to Pre-Mongoloid branch of Lebzelter[52] and Pre-Malayic of Christian.[53] Piggot[54] pointed out that broad headed 'Alpine' type was also represented at Sialk in Iran in the fourth millennium B.C. Definite Mongoloid features were also not traceable by us from the present available cranial material of Harappa.

The presence of certain primitive features, *viz.*, low headed type with prominent supra-orbital ridges, very flat nose (hyperplatyrrhine) associated with depressed nasal root and high variability of nasal characters particularly the occurrence of mesorrhine, platyrrhine, hyper-platyrrhine noses noticed in certain Harappa crania leads us to believe that a definite intermixture had taken place between higher type and certain primitive aboriginal people akin to Veddoid or Australoid type. This contention was supported by Guha[55] who, in course of describing racial elements represented at Harappa skeletal materials, added that in jar burial in stratum I indicated 'a definite admixture with a small low-headed race, such as seen among the present aboriginal population of India'. The presence of large headed dolicho-cranial skulls associated with prominent supraorbital ridges, high cranial vault, comparatively long narrow-face and heavy muscular features, was defined as 'Proto-Australoid' type by Sewell and Guha on studying Mohenjo-daro collections. Such type of skull was also in evidence in the present study of Harappa collection but it was termed by us as Proto-Nordic (vide pl. I) instead of Proto-Australoid.

It may be metioned from the available data that the Racial elements present in the pre- and proto-historic human remains of Indus Valley Civilization, particularly of Mohenjo-daro, Chanhu-daro, Harappa, Lothal etc. are as follows—Sewell and Guha defined three skulls of Mohenjo-daro as proto-Australoid, six as Mediterranean, one as Mongolian branch of Alpine stock and four possibly as Alpine. The analysis of the different cranial, facial, nasal & orbital characters of Harappa skulls excavated from different strata or sites studied by present authors revealed the existence of the following Racial types—(a) large headed rugged dolichocranial type akin to proto-Nordic, (b) small smooth dolichocranial type akin to Proto-Mediterranean or Mediterranean type, (c) broad headed type related to Alpine and Armenoid and (d) a low headed dolicho-mesocranial type bearing primitive features akin to Veddoid (vide plate XI) or Australoid type. Chanhu-daro skull showed Proto-Mediterranean type while the Lothal finds yielded three basic types viz. (a) Large long headed rugged type akin to Proto-Nordic, (vide plate X) (b) medium headed smooth type akin to Proto-Mediterranean or Mediterranean type, and (c) Broadheaded type akin to Alpine and Armenoid.

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[49] Vats M. S. 1940—Excavations at Harappa, pp. 238

[50] Buxton L.H.D. & Talbot Rice D, 1931—The Report on the human remains found at Kish (J. Roy Anthrop. Inst. LXI p.p. 57-119)

[51] Vallois H. V. 1936—Notes sur les Tetes osseuses. In Contenau G. and Ghirshman A. "Fouilles de TepeGiyan" Paris

[52] Lebzelter V. 1931—Schadel aus Persien, Mus Wien vol XLV, p.p. 137-157

[53] Christian V. 1932—Altkleinasiatische Volker (in Ebeling and Meissner Reallexikon der Assyriologie, I, p.p. 76-88)

[54] Piggott S. 1950—Prehistoric India, p. 147-49

[55] Vats M.S. 1940—Excavations at Harappa p.p. 238-39,

Occurrance of such racial elements at Lothal[56] enabled us to infer that the same racial strain alike to Harappa, continued to post-Harappan period. It may also be remarked that the long-headed Proto-Mediterranean or Mediterranean type constituted the dominant element of the Indus Valley Civilization. This type was widespread all over the pre and proto-historic people of Western Asia, India and also at coastal tracts of Europe. The presence of long-headed rugged type of people at Indus Valley particularly found at cemetery R 37 of Harappa leads us to infer the advent of so called 'Indo-Aryan' or 'Aryan' speaking people, allied to proto-Nordic people of early Iran & Punjab. The presence of a few Broad headed people, akin to Alpine and Armenoid type at Indus Valley was supposed to have entered India through North-West from Asia Minor, Iranian and Pamir Plateau or from Caucasoid zone. In addition to these Racial elements, the comparative mean values of different cranial measurements & indices of Harappa crania with those of pre and proto-historic crania of India & Western Asia,(vide tables 3, 4, 5 & 6) had showed the presence of close racial affinity in certain cranial characters particularly with the following—*viz.* Ur (c. 2000—1000 B.C.), Al-Ubaid (c. 3200—2800 B.C.), Kish (c. 3200–2400 B.C.), HissarIII (c. 3000 B.C.),p roto-Nordic, Hissar III (Mediterranean), pre-Dynastic Naqada (c. 3200 B.C.), Kerma (Nubia) 12th to 13th dynasty, Palestine Megiddo (Chalcolithic) c. 3300 B.C., Crete (c. 3000—1500 B.C.), Greece Early Helladic (Neolitic c. 3200—2000 B.C.), East Cyprus Lapithos Mellia Enkomi, (c. 2800—1100 B.C.), N.E. Balkans, Bulgaria Bessarabia Chalcolithic (c.2500—1700 B.C.), Shah Tepe (c. 3000—2000 B.C.). Palestine Megiddo Bronze Age (c. 2600—1200 B.C.), Palestine Palmyra (2nd & 3rd century B.C.), Urkraine Bronze Age (c. 1600—800 B.C.), Yabrud (North Palestine) and also Mohenjo-Daro, Nal, Sialkot, Adittanallur & post Harappan skull of Lothal.

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[56] Chatterjee B. K. and Kumar G. D.—Racial elements in post-Harappan skeletal remains at Lothal. Anthropology on the March 1963, pp. 104-10.

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Table 1

Shows the comparative values of frequencies and percentages of different cranial, facial, nasal and orbital characters of adult male and female crania excavated from different sites and Strata of Harappa.

	AREA G				CEMETERY H OPEN BURIAL				CEMETERY H JAR BURIAL				CEMETERY R. 37				MOUND AB			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
Cranial index	Freq.	%	Freq	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq	%	Freq.	%	Freq.	%
Hyperdolicho cranial (65.0-69.9)					1	25.00			1	16.67			5	31.25	4	33.33				
Dolicho-cranial (70.0-74.9)	2	40.00	2	50.0	1	25.00	1	25.00			4	66.67	8	50.00	6	50.00	1	100.0	1	50.00
Mesocranial (75.0-79.9)	3	60.00	2	50.00	2	50.00	3	75.00	4	66.67	1	20.00	3	18.75	2	16.67				
Brachycranial (80.0-x)									1	16.66									1	50.00
Length-height Index																				
Chamae-cranial (x-69.9)	1	20.00	1	25.00					1	25.00	3	50.00	4	30.77	5	62.50				
Orthocranial (70.0-74.9)	3	60.00	2	50.00	3	100.00	2	66.57	2	50.00	1	20.00	8	61.54	3	37.50	1	100.0	1	50.00
Hypsicranial (75.0-x)	1	20.00	1	25.00			1	33.33	1	25.00	1	20.00	1	7.69					1	50.00
Breadth-height index																				
Tapeino-cranial (x-91.9)													1	7.59	1	12.50			1	50.00
Metriocranial (92.0-97.9)	4	80.00	3	75.00	1	33.33	1	33.33	2	50.00	2	40.00	3	23.08	4	50.00				
Acrocranial (98.0-x)	1	20.00	1	25.00	2	66.67	2	66.67	2	50.00	2	60.00	9	69.23	3	37.50	1	100.0	1	50.00

Table 1 (contd)

	AREA G				CEMETERY H OPEN BURIAL				CEMETERY H JAR BURIAL				CEMETERY R. 37				MOUND AB			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
Superior facial index	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Hypereuryene (x-44.9)	..	..	..	..	..	..	..	..	..	..	..	..	1	11.11	..	..	..	..	..	..
Euryene (45.0-49.9)	..	..	..	..	..	..	..	..	1	50.00	..	..	1	11.11	..	..	..	..	..	..
Mesene (50.0-54.9)	2	66.67	1	33.33	2	100.00	1	50.00	..	..	1	33.33	5	55.56	2	50.00	..	..	1	100.0
Leptene (55.0-59.9)	1	33.33	2	66.67	..	..	..	..	1	50.00	1	33.33	2	22.22	2	50.00	..	..	..	..
Hyperleptene (60.0-x)	..	..	..	..	..	..	1	50.00	..	..	1	33.33	..	..	..	..	..	..	..	..
Orbital character																				
Chamaeconch (x-75.9)	1	20.00	1	25.00	1	20.00	..	..	..	..	..	..	2	18.18	..	..	..	..	..	..
Mesoconch (76.0-84.9)	4	80.00	1	25.00	2	40.00	..	..	3	75.00	1	25.00	5	45.46	6	46.15	1	100.00	1	100.00
Hypsiconch (85.0-x)	..	..	2	50.00	2	40.00	3	100.00	1	25.00	3	75.00	4	36.36	7	53.85	..	..	..	..
Nasal character																				
Leptorrhine (x-46.9)	..	..	2	50.00	1	14.29	..	..	..	..	1	25.00	5	35.71	4	28.57	1	100.00	1	50.00
Mesorrhine (47.0-50.9)	2	40.00	1	25.00	4	57.13	1	33.33	1	25.00	..	..	4	28.57	6	42.86	..	..	1	50.00
Chamaerrhine (51.0-57.9)	3	60.00	1	25.00	1	14.29	2	66.67	..	..	1	25.00	2	14.29	3	21.43	..	..	..	..
Hyperchamaerrhine (58.0-x)	..	..	..	..	1	14.29	..	..	3	75.00	2	50.00	3	21.43	1	7.14	..	..	..	..

Table 2

Shows the comparative values of frequencies and percentages of Transverse-fronto-parietal index, Maxillo-alveolar, Palatal indices, Cranial capacities and degrees of facial prognathism of adult male and female crania excavated from different strata and sites of Harappa.

Transversefronto parietal index	AREA G				CEMETERY H OPEN BURIAL				CEMETERY H JAR BURIAL				CEMETERY R. 37				MOUND AB			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	Freq	%	Freq	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Ultramicrosem (x-54.9)	..	..	..	..	..	..	..	..	..	..	..	..	1	6.67	..	..	..	..	..	..
Microsem (60.0-64.9)	..	..	..	..	1	50.00	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Megasem (65.0-69.9)	1	20.00	2	50.00	..	..	1	33.33	3	60.00	2	40.00	5	33.33	3	30.00	..	..	..	..
Mesosem (70.0-74.9)	2	40.00	2	50.00	1	50.00	2	66.67	2	40.00	2	40.00	6	40.00	6	60.00	1	100.0	1	50.00
Hypermegasem (75.0-79.9)	2	40.00	..	..	..	..	..	..	..	..	1	20.00	1	10.00	..	..	..	..	..	..
Maxillo-alveolar index																				
Dolichuranisch (x-109.9)	..	..	2	50.00	..	..	1	50.00	...	..	..	..	3	42.86	3	27.27	1	100.0	..	..
Mesuranisch (110.0-114.9)	..	..	..	..	2	33.33	..	..	..	..	1	33.33	1	14.28	1	9.09	..	..	..	..
Brachyuranisch (115.0-x)	4	100.0	2	50.00	4	66.67	1	50.00	2	100.00	2	66.67	3	42.86	7	63.64	..	..	1	100.00
Palatal index																				
Leptostaphylin (x-79.9)	2	40.00	1	25.00	..	..	1	25.00	..	..	1	25.00	2	33.33	2	15.39	1	100.00	..	..
Mesostaphylin (80.0-84.9)	..	..	..	..	1	16.66	..	...	1	50.00	1	25.00	2	33.34	3	23.08	...	...	..	..
Brachystaphylin (85.0-x)	3	60.00	3	75.00	5	83.24	3	75.00	1	50.00	2	50.00	2	33.33	8	61.53	..	..	1	100.00

Table 2 (contd.)

	AREA G				CEMETERY H OPEN BURIAL				CEMETERY H JAR BURIAL				CEMETERY R. 37				MOUND AB			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Cranial capacity (in ccm)																				
Oligencephal	1	20.00	1	25.00	1	33.33	1	25.00	1	20.00	2	50.00	2	13.33	1	8.33	..	..	1	100.0
Euencephal	2	40.00	2	50.00	1	33.33	1	25.00	3	60.00	2	50.00	9	60.00	7	58.33	1	100.0	..	..
Aristencephal	2	40.00	1	25.00	1	33.33	2	50.00	1	20.00	..	..	4	26.67	4	33.34	..	..	..	..
Facial prognathism																				
Prognathic (70°-79°.9)	..	..	2	50.00	1	20.00	..	...	..	..	2	50.00	..	..	1	16.66	..	..	..	..
Mesognathic (80.0°-84.09°	2	66.67	1	25.00	3	60.00	1	50.00	2	66.67	2	50.00	4	66.67	3	50.00	...	..	..	..
Orthognathic (85.0°-92.9°)	1	33.33	1	25.00	1	20.00	1	50.00	1	33.33		..	2	33.33	2	33.35	..	..	..	..

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Characters	Harappa Male (38)	Harappa Female (34)	Mohenjo-daro (14)	Chanhu-daro (1)	Lothal	
					Male (4)	Female (4)
Cranial						
Maximum cranial length	183.97	177.64	181.81	178.0	179.67	180.00
Maximum cranial breadth	134.78	129.89	127.6	126.5	144.00	148.00
Auricular height	113.58	105.00	116.16	108.0	120.50	109.00
Basion bregmatic height	132.38	127.05	133.0	123.0	....	......
Horizontal cranial circumference	523.67	498.86	491.0	492.0	540.50	525.25
Nasion basion line	98.93	97.52	......	94.0	98.00	95.00
Cranial index	73.09	73.31	70.54	71.07	78.36	78.95
Length-height index	71.84	72.17	73.75	69.10	74.37	69.16
Breadth-height index	99.38	98.75	104.48	97.23	......	......
Cranial capacity (ccm)	1388.96	1232.08	......	......	1573.68	1600.17
Facial						
Minimum frontal Br.	95.70	92.50	89.84	97.0	98.67	99.50
Maximum Bizygomatic breadth	131.31	118.69	120.5	124.0	......	131.00
Bigonial breadth	89.10	81.20	......	......	......	......
Superior facial ht.	68.40	65.58	64.96	61.0	68.33	62.50
Superior facial index	52.93	55.40	53.21	49.03	......	52.59
Zygomatico frontal index	73.07	75.55	76.56	......	......	......
Fronto-parietal index	102.03	98.14	......	......	......	......
Cranio-facial index	98.27	92.73	49.50	98.02	49.74	49.48
Nasal						
Nasal height	51.14	48.32	46.43	48.5	47.00	45.00
Nasal breadth	26.34	24.04	22.0	25.0	26.50	25.00
Nasal index	51.97	49.60	49.00	51.55	57.44	55.58
Orbital						
Orbital height	34.67	33.64	32.67	32.5	32.29	33.75
Orbital breadth	41.14	38.51	37.36	43.0	42.25	36.62
Orbital index	82.78	86.13	87.63	75.58	76.16	88.32

Table 3

Bayana Male (1)	Sialkot Female (1)	Maski (1)	Nal (1)	Taxila (3)	Adittanallur	
					Male (8)	Female (5)
178	180	186.0	188.51	189.3 ?	185.86	187.0
127	128	137	132.0 ?	142.7 ?	130.56	128.0
108	119	......	120.0	130.0	117.33	114.2
130	140	......	146.0	130	133.50	126.0
......	......	530.0	528 ?	530.5	517.0	498.0
......	......	......	99.5	103	102.0	93.0
71.30	71.10	73.56	70.02	75.36 ?	69.90	......
73.60	77.78	......	77.45	61.88 ?	70.87	......
..	......	......	110.6	82.38 ?	102.82	......
1250.5	1360.0	......	1449.2	1552.12 ?	......	......
90	98	94.0	93.0 ?	96.0	95.0	98.0
136	......	......	120.0 ?	......	126.0	128.0
....	......	......	......	100.7	......	......
....	......	59.0	72.0	......	61.0	......
....	......	......	60.00	......	......	......
....	....	......	76.67	......	......	......
....	......	46.0	49.0	55.0	51.0	47.0
....	......	21.0	23.0	24.0	25.0	27.0
....	......	......	46.94	43·73	......	......
....	......	42.0	33.0	......	33.75	32.0
....	......	43.0	40.00	......	41.0	40.0
....	......	......	82.50	......	......	......

Table 4

Characters	Harappa Male (38)	Harappa Female (34)	Ur (c. 2000-1000 B.C.) Male (3	Ur (c. 2000-1000 B.C.) Female (4)	Al-Ubaid (c. 3200-2800 B.C. (Male) (8)	Kish (c. 3200-2400 B.C. (19	Alishar (c. 3000-2400 B.C. Chalco-lithic Female (1)	Alishar (c. 3000-2400 B.C. Copper-Age Male (6)	Female (1)	Anau (2)	Troy (c. 3000-2200 B.C. I-III Kum Tepe, Babakoy	Sialk I-IV (c. 4000-2700 B.C.
Cranial												
Maximum Cranial length	183.97	177.64	193.67	184.75	192.8	187.83(29)	179.0	182.1	177.0	185.0	191.3(6)	196.00(6)
Maximum ,, breadth	134.78	129.89	135.00	131.50	140.1	136.45(29)	130.0	135.0	137.0	141.0	138.3(6)	134.83(6)
Auricular ,, height	113.58	105.00	116.32	116.75	119.6	122.56(16)	....	....	....	....	117.2(5)	118.00(6)
Basion Bregmatic ,,	132.38	127.05	144.50	136.00	136.50	132.58 ?(12)	....	136.4	....	....	138.0(3)	....
Nasion Basion Line	98.93	97.52	....	....	105.7	103.63(8)	....	102.9	....	....	....	530.00(5)
Horizontal cranial Circumference	523.67	498.86	....	....	....	524.19(16)	....	....	....	....	530.8(5)	380.0(5)
Sagittal arc.	372.71	353.04	....	....	....	375.00(12)	....	....	....	....	393.0(2)	....
Transverse Arc.	302.97	289.40	....	....	....	300.83(12)	....	....	....	....	314.0(2)	....
Cranial Index	73.09	73.31	69.80	71.25	72.67	72.86(28)	72.60	74.2	77.40	76.20	72.5(6)	68.78(6)
Length-Height Index	71.84	72.17	72.62	72.70	70.80	70.59	75.1	75.1	....	....	71.6(3)	....
Breadth-Height Index	99.38	98.75	105.48	103.03	97.43	97.16	....	100.3	....	....	100.9(3)	....
Cranial Capacity (ccm)	1388.96	1232.08	1413.50	1272.00	1498.50	....	....	....	....	1378.1	....	....
Facial												
Minimum frontal br.	95.70	92.50	97.67	93.00	97.0	94.96(24)	84.0	91.3	93.5	....	95.7(6)	94.83(6)
Maximum bizygomatic br.	131.31	118.69	132.33	120.00	127.6	126.56(9)	124.0	124.4	113.0	....	127.8 ?(5)	134.00(5)
Bigonial breadth	89.00	81.20	96.50	94.00	98.6	....	....	....	....	....	100.0 ?(4)	93.40(5)
Superior facial ht.	68.40	65.58	76.67	65.00	72.0	70.00(5)	66.0	69.6	....	....	67.2(4)	75.00(6)
Superior facial index	52.93	55.40	57.98	54.16	56.43	55.31	53.2	56.0	....	....	53.4 ?(4)	55.38(5)
Zygomatico frontal index	73.07	75.55	57.98	76.66	75.02	75.03	75.8	73.5	82.7	....	74.9 ?(5)	70.77
Fronto-parietal ,,	102.03	98.14	....	....	....	....	....	....	....	....	69.2(6)	70.27(6)
Cranio-facial ,,	98.27	92.73	....	....	91.08	92.75	95.4	92.2	82.5	....	93.3 ?(5)	99.38
Facial angle	84.00	81.75	....	....	....	....	....	....	....	....	....	85.67(3)
Nasal												
Nasal height	51.14	48.32	54.67	46.00	54.00	55.80(5)	46.0	48.8	....	....	50.0(4)	54.60(5)
Nasal breadth	26.34	24.04	26.67	24.25	25.7	23.83(6)	22.0	24.9	....	....	23.6(4)	23.60(5)
Nasal index	51.97	49.60	48.77	52.17	47.59	42.71	47.80	51.3	....	46.8	47.0(4)	48.22(5)
Orbital												
Orbital height	34.67	33.54	36.00	36.00	33.6	33.73(13)	35.0	33.7	31.0	30.0	31.7(3)	32.81
Orbital breadth	41.14	38.51	40.00	39.00	40.00	41.43(12)	38.0	38.9	37.0	36.0	38.3(3)	40.00
Inter-orbital breadth	19.41	18.88	....	....	....	....	....	....	....	....	24.0(1)	20.25(4)
Orbital index	82.78	86.13	90.00	79.48	84.00	81.41	92.10	87.1	83.80	83.30	81.9(3)	82.02(5)

Table 5

Character	Harappa Male (38)	Harappa Female (34)	Palestine Megiddo Chalcolithic (c. 3300 B.C.)	Palestine Megiddo Bronze Age (c. 2600-1200 B.C.)	Palestine Palmyra (2nd & 3rd century B.C.	Crete (c. 3000 -1500 B.C.)	E. Cyprus Bronz Age Lapithos Melia Enkomi (c. 2800 1100 B.C.)	Greece Neolithic And Early Helladic (c. 3200-2000 B.C.)	N.E. Balkans Chalcolithic Bulgaria-Bessarabia (c. 2500-1700 B.C.	Armenia Sevan Iron Age (c. 1000-600 B.C.)	Ukraine Bronze Age (c. 1600-800 B.C.)	Yabrud N. Palestine (c. 1600-800 B.C.
Cranial												
Maximum cranial length	183.97	177.64	190.50(6)	186.00(5)	186.5(6)	186.4(64)	176.45(51)	185.1(22)	182.23(13)	189.7(24)	191.1(11)	180.6(6)
Maximum cranial breadth	134.78	129.89	135.17(6)	143.00(5)	138.1(6)	136.8(50)	142.70(53)	139.6(24)	138.50(14)	137.8(24)	141.4(11)	135.5(6)
Auricular height	113.58	105.00	....	....	124.3(6)	118.9(25)	117.45(33)	117(19)	120.00(2)	....	....	130.6(6)
Basion bregmatic ht.	132.38	127.05	132. (1)	139.75(4)	..	130.2(20)	136.72(39)	135.7(10)	134.55(11)	131.7(24)	140.5(8)	....
Horizontal cranial circumf.	523.67	498.86	....	....	....	515.9(21)	510.87(38)	514.7(22)	520.88(9)	528.8(24)	....	....
Sagittal Arc	372.71	353.04	....	..	..	....	368.23(37)	373.8(11)	379.11(9)	....	....	....
Transverse Arc	302.97	289.40	....	....	....	....	325.53(37)	310.2(12)	309.00(2)	....	....	....
Cranial index	73.09	73.31	71.02(6)	76.89(5)	73.6(6)	73.4	80.97(51)	75.8(23)	75.81(13)	72.8(24)	74.0(11)	74.8(6)
Length-height index	71.84	72.17	....	74.78(4)	66.2(6)	69.9	78.14(39)	73.50(10)	73.58(11)	69.4(24)	73.52	72.3(6)
Breadth-height index	99.38	98.75	....	97.63(4)	....	95.18	95.57(39)	97.8(10)	98.11(11)	95.8	99.36	....
Cranial capacity	1388.96	1232.08	....	....	....	....	....	....	....	....	....	....
Facial												
Minimum frontal Br.	95.70	92.50	97.25(4)	99.80(5)	....	....	97.72(46)	96.3(21)	96.31(13)	99.2(24)	....	....
Maximum bizygomatic br.	131.31	118.69	132.0(1)	139.33(3)	123.3(3)	122.5(5)	129.54(22)	128.2(10)	127.96(12)	130.4(16)	134.5(10)	....
Bigonial breadth	89.00	81.20	....	....	....	....	97.50(8)	93.7(10)	....	....	....	....
Superior facial ht.	68.40	65.58	....	69.00(3)	71.0(3)	65.0(13)	67.48(33)	70.2(10)	66.60(10)	70.7(20)	68.6(11)	67.0(5)
Superior facial index	52.93	55.40	....	49.51(3)	57.5(3)	53.1	52.45(22)	54.7(9)	52.05	55.5(13)	51.00	....
Zygomatico-frontal index	73.07	75.55	....	71.07(3)	....	....	75.44	75.4(10)	75.27	76.07	....	....
Fronto-parietal index	102.03	98.14	72.46(4)	69.84(5)	....	....	68.56(46)	69.2(21)	69.86(13)	71.99	....	....
Cranio-facial index	98.27	92.73	97.06(1)	97.86(3)	....	89.55	90.78	91.7(10)	92.39	94.64	95.12	....
Facial angle	84.00	81.75	....	....	....	....	94.50(20)	....	....	....	....	....
Nasal												
Nasal height	51.14	48.32	....	50.17(3)	50.2(4)	48.9(13)	49.97(36)	50.2(10)	48.81(11)	52.5(23)	....	49.0(5)
Nasal breadth	26.34	24.04	....	25.67(3)	23.5(4)	24.2(10)	24.08(35)	24.0(10)	23.72(11)	23.7(22)	....	23.5(5)
Nasal index	51.97	49.60	....	51.61(3)	46.9(4)	49.4	48.29(34)	48.0(10)	48.69(11)	45.5(22)	50.4(12)	48.1(5)
Orbital												
Orbital height	34.67	33.54	....	33.00(3)	37.5(4)	31.7(22)	32.42(36)	32.67(9)	31.27(11)	33.3(23)	....	....
Orbital breadth	41.14	38.51	....	38.33(3)	32.0(4)	39.5(13)	39.28(8)	38.8(8)	38.75(12)	40.2(23)	....	....
Orbital index	82.78	86.13	....	84.99	85.3(4)	80.2	82.64(35)	83.1(7)	80.70	82.5(23)	80.6(12)	....

Characters	Harappa Male (38)	Harappa Female (34)	Shah Tepe II—III (c. 3000-2000B.C.)	Hissar III (Proto-Nordic c. 3000 B.C.)	Hissar III (Meditterranean)
Cranial					
Maximum Cranial Lth.	183.97	177.64	188.57(7)	191.67(39)	186.25(51)
Maximum Cranial Bdth.	134.78	129.89	139.43(7)	135.95(39)	133.12(51)
Auricular height	113.58	105.00	117 (1)	117.25(36)	114.46(48)
Basion bregmatic Ht.	132.38	127.05	......	138.49(37)	132.93(42)
Nasion basion line	98.93	97.52	......	104.81(37)	100.67(42)
Horizontal cranial circumference	523.67	498.86	530.50(2)	523.46(39)	510.62(50)
Sagittal arc	372.71	353.04	370.33(3)	385.85(3)	375.29(49)
Transverse arc	302.97	289.40	......	312.39(38)	302.61(49)
Cranial index	73.09	73.31	73.93(7)	70.85(39)	71.65(51)
Length-height index	71.84	72.17	......	72.16(37)	71.79(42)
Breadth height index	99.38	98.75	......	101.81(37)	99.64(42)
Cranial capacity (ccm)	1388.96	1232.08	......	......	....
Facial					
Minimum frontal br.	95.70	92.50	95.67(6)	97.21(39)	94.51(51)
Maximum bizygomatic br	131.31	118.69	123. (1)	130.03(35)	124.95(43)
Bigonial breadth	89.00	81.20	......	100.72(32)	95.00(35)
Superior facial ht.	68.40	65.58	70 (1)	71.21(39)	69.14(49)
Superior facial index	52.93	55.40	......	54.79(34)	54.94(42)
Zygomatico frontal index	73.07	75.55	......	74.76	75.64
Fronto-parietal index	102.03	98.14	68.00	71.72(39)	71.06(50)
Cranio-facial index	98.27	92.73	......	95.69(35)	94.13(43)
Facial angle	84.00	81.75	83.0(1)	86.78(36)	86.43(40)
Nasal					
Nasal height	51.14	48.32	49.(1)	51.21(39)	50.50(48)
Nasal breadth	26.34	24.04	23. (1)	25.51(39)	24.82(44)
Nasal index	51.87	49.60	......	49.87(39)	49.41(44)
Orbital					
Orbital height	34.67	33.54	31 (1)	32.15(39)	32.16(49)
Orbital breadth	41.14	38.51	37. (1)	40.51(39)	38.90(41)
Orbital index	82.78	86.13	......	79.36	82.67

Table 6

Egypt (Badari) c. 4000 B.C.	Egypt (Predynastic) c. 4000 B.C.	Egypt (Predynastic) Naqada c. 3200 B.C.	Lower Egypt Sakkara (1st dynasty) c. 3000 B.C.	Sedment (9th dynasty) c. 2400 B.C.	Egypt Kerma	
					Male	Female
182.5(81)	188.3(60)	185.13(139)	186.9(41)	181.9(40)	185.21(138)	177.2(114)
131.6(81)	137.1(59)	134.87(139)	138.7(43)	138.3(40)	133.6(136)	129.8(112)
115.7(41)	......	115.59(140)	114.8(27)	115.3(39)	110.7(125)	107.4(91)
134.1(77)	137.2(50)	134.21(134)	135.4(32)	137.4(38)	133.4(93)	127.8(88)
100.3(76)	105.5(45)	99.34(109)	102.7(29)	100.8(37)	......	......
500.00(80)	517.1(57)	511.02(118)	518.8(29)	511.7(40)	510.2(133)	488.9(107)
371.3(78)	......	373.02(119)	......	373.8(36)	374.7(133)	360.3(105)
302.0(34)	......	303.76(105)	......	314.9(39)	305.0(123)	291.8(89)
72.1(81)	72.8(59)	72.99(39)	74.2(39)	76.1(40)	72.2(133)	73.3(112)
73.7(77)	72.9(50)	72.50	72.8(30)	75.5(38)	72.4(91)	72.4(88)
98.2(77)	100.07	99.51	97.6	99.4	99.0(98)	101.6(77)
....	....	......	....	....	....	....
91.1(81)	97.6(60)	91.06(140)	96.5(36)	92.6(40)	92.8(139)	89.2(111)
123.6(61)	132.1(23)	125.63(63)	127.8(14)	127.2(29)	127.5(83)	118.9(52)
88.8(32)	......	......	......	92.0(32)	......	......
67.1(34)	......	67.59(85)	71.9(30)	71.5(38)	......	......
54.29	......	53.80	56.3	56.2	51.3(32)	50.7(22)
73.70	73.88	72.48	75.5	72.8	72.7(104)	72.2(79)
69.22	71.19	67.52	69.6	67.0	......	......
93.92	96.35	93.15	92.1	92.0	......	......
......	......	99.17	......	......	81.8(88)	81.8(59)
48.4(34)	50.7(43)	48.94(91)	51.2(29)	51.4(38)	50.0(105)	47.1(90)
24.8(76)	25.3(42)	25.12(86)	25.4(30)	24.5(39)	25.8(114)	25.0(89)
51.6(34)	49.9(42)	51.08(77)	49.5(29)	47.7(38)	51.6(111)	53.3(85)
32.0(34)	32.9(47)	32.67(80)	32.5(26)	33.3(40)	32.7(103)	32.5(85)
38.4(33)	39.6(47)	39.10(76)	38.9(26)	39.7(35)	41.5(105)	39.7(86)
83.3(33)	83.1(47)	82.32(76)	83.6(26)	84.1(35)	78.6(113)	81.6(84)

PROTO-NORDIC

Shows the comparative mean values of orbital measurements and indices

	Harappa Proto-Nordic Finer type		Harappa Proto-Nordic Rugged type	Hissar I	Hissar II	Hissar III
	Male (4)	Female (2)	Male (3)	Male (1)	Male (2)	Male (39)
Max. Cranial length	185.00	170.50	186.00	198.00	187.50	191.67
Max. cranial breadth	132.75	130.00	132.66	131.00	137.00	135.95
Max. cranial height	132.00	132.50	131.33	......	137.00	138.49
Max. bizygomatic br.	130.67	117.00	130.00	......	126.50	130.03
Upper facial height.	72.50	63.00	79.67	......	73.00	72.21
Orbital br.	40.25	41.00	41.67	......	40.50	42.54
Orbital ht.	34.25	38.00	36.00	......	29.50	32.15
Orbital index	75.41	92.45	88.30	......	74.71	75.80
Nasal ht.	53.25	44.50	50.00	......	53.50	51.21
Nasal br.	28.00	22.50	27.66	......	25.00	25.51
Nasal index	51.69	50.53	54.25	......	46.72	49.87
Length breadth index	72.04	77.84	71.58	66.16	73.14	70.85
Length ht. index	71.61	77.20	70.40	......	73.14	72.16
Upper facial index	55.08	54.00	53.33	......	57.71	54.79

Table 7

CRANIAL TYPE

different cranial, facial, nasal and
of Proto-Nordic cranial type

Hissar III Female (1)	Mohenjo-daro Male (3)	Al-Ubaid Male (5)	Kish 'A' Male (1)	Alishar Copper-age Male (1)	Combe-capelle Male (1)	Caspian (Dixon)	Panjabi Male (12)	Hindukush Male (5)
175.00	197.00	..	196.00	192.00	200.00	183.00	182.09	178.2
139.00	130.00	..	137.00	136.00	132.00	133.00	129.83	134.2
127.00	139.00	..	139.00	131.00	137.50	139.00	129.00	127.0
123.00	127.00	127.60	130.00	128.00	130.00	133.00	123.25	124.4
65.00	....	..	....	68.00	80.50	71.00	..	....
42.00	37.00	..	40.00	41.00	40.00	....	39.25	37.0
31.00	31.25	..	33.40	34.00	28.00	....	33.58	35.0
73.81	84.46	83.40	82.50	82.90	70.00	....	85.51	97.4
50.00	46.50	53.30	....	51.00	....	53.00	48.67	49.2
22.00	22.00	..	....	24.00	28.10	23.00	23.17	23.0
44.00	51.06	49.20	....	47.10	....	43.40	47.48	45.8
79.43	66.02	72.60	70.00	70.90	66.00	72.60	70.90	75.4
72.57	70.68	71.26	70.92	68.20	68.75	76.50	71.02	71.2
52.85	53.93	55.10	....	53.10	61.92	54.70	68.24	54.2

MEDITERRANEAN

Shows the comparative mean values of measurments and indices of

	Harappa		Nal	Bayana	Anau	Mohenjo-daro	Hissar II		Hissar II	Hissar I
	Male	Female	Male	Male	Female	Male	Female	Male	Female	Female
	(7)	(11)	(1)	(1)	(1)	(2)	(4)	(7)	(7)	(1)
Max. cranial length	181.33	177.90	188.50	178	185.00	178.50	180.17	189.14	178.29	175.00
Max. Cranial breadth	132.85	130.80	132.00	127	141.00	128.00	118.33	130.57	132.14	131.00
Max. Cranial height	131.83	121.75	146.00	108		132.00	136.00	134.00	129.86	
Max. bizygomatic breadth	130.50	122.75	120.00	136			94.00	124.83	116.20	
Upper facial height	68.00	68.00	72.00					69.14	67.57	
Orbital br.	39.71	38.45	40.00		36.00	36.00	38.25	41.17	38.71	
Orbital ht.	38.20	34.00	33.00		30.00	32.25	32.94	32.14	30.71	
Orbital index	82.19	87.98	82.50		83.33	89.57	87.92	76.93	79.33	
Nasal height	50.33	47.75	49.00			46.00	46.13	49.47	48.29	
Nasal breadth	25.00	24.25	23.00			23.00	22.13	25.14	23.71	
Nasal index	50.11	52.65	46.94			48.94	48.04	49.56	49.14	
Length breadth index	72.98	73.80	70.02	71.30	76.20	71.71	63.45	69.26	74.10	74.85
Length height index	72.99	70.91	77.45	73.60		73.95	75.66	70.75	72.86	
Upper facial index	50.15	52.58	60.00					55.61	56.38	

Table 8

CRANIAL TYPE

different cranial, facial, nasal and orbital
Mediterranean cranial type

Hissar III		Al-Ubaid	Kish 'A'	Kish 'A'	Ur	Ur	Alishar Chalcolithic	Alishar Copper Age		Hissar-Lik III	Hanai Tepe 'B'	Mediterranean Type (Dixon)
Male (51)	Female (32)	Male (8)	Male (2)	Female (1)	Male (3)	Female (4)	Female (1)	Male (6)	Female (1)	Male (2)	Female (1)	
186.25	180.33	192.80	186.50	176.00	193.67	184.75	179.00	182.10	177.00	192.00	179.00	190.00
133.12	131.58	140.10	131.00	124.00	135.00	131.50	130.00	135.00	137.00	136.75	128.00	135.00
132.93	129.26	136.50	138.00	142.00				136.40				129.00
124.95	120.56	127.60		110.00			124.00	124.40	113.00	....	....	130.00
69.14	66.47		72.00	62.00			66.00	69.60	....	....	....	71.00
40.56	39.94	40.00	43.00	37.00			38.00	38.90	37.00	38.00	....	......
32.16	31.97	33.60	35.00	34.40			35.00	33.70	31.00	30.00	....	......
79.34	80.12	84.00	81.40	91.89			92.10	87.10	83.80	78.90	....	......
50.50	48.59	54.00		49.50	52.00		46.00	48.80	... ...	48.00	....	53.00
24.82	23.84	25.70	23.50	30.50	26.00		22.00	24.90	.. ..	24.50	....	23.00
49.41	50.37	47.60		61.61	50.00		47.80	51.30	.....	50.85	....	43.40
71.65	72.97	72.60	70.23	70.45	69.80	71.25	72.60	74.20	77.40	71.20	71.50	71.10
71.79	71.87	71.20	73.93	80.68				75.11	....	....	....	68.00
54.94	55.31	54.87		56.36			53.20	56.00	....	....	....	55.20

ALPINE

Shows the comparative mean values of facial,

	Harappa Alpine-Armenoid Type Male (2)	Harappa Alpine-Armenoid Type Female (2)	Hissar III Male (3)	Mohenjo-daro No. 8 Male (1)	Alishar Early Bronze Male (2)
Max. Cranial length	178.00	186.50	177.00	172.00	180.50
Max. Cranial breadth	135.00	130.5	133.67	131.00	142.50
Max. Cranial height	120.00	95.00	134.00	130.00	136.00
Max. bizygomatic br.	134.0	123.00	128.33	124.00	135.50
Upper facial ht.	69.0	67.00	66.67		60.00
Orbital breadth	43.0	39.00	40.67	41.00	36.00
Orbital height	36.00	33.00	31.00	29.50	34.00
Orbital index	83.33	76.92	76.22	71.95	94.40
Nasal height	54.00	50.00	46.33	46.00	49.00
Nasal breadth	26.00	22.00	27.33	26.00	26.00
Nasal index	50.00	44.00	50.59	56.62	53.00
Length breadth index	79.41	75.74	75.32	76.16	79.10
Length height index	74.58	74.62	75.72	75.58	77.70
Upper facial index	51.49	—	52.02	51.61	43.80

Table 9

CRANIAL TYPE

nasal and orbital measurements & indices of Alpine cranial type

Alishar Hittite Empires		Scythians.	Palae-Alpine (Dixon)	Alpine (Dixon)	Mongoloid (Dixon)
Male (8)	Female (3)				
182.90	174.30	183.6	178.0	174.0	180.0
144.60	141.00	140.9	146.0	148.0	150.0
125.90	121.50	132.6	136.0	136.0	123.0
129.80	125.00	133.3	132.0	134.0	136.0
68.60	62.00	68.0	64.0	73.0	66.0
40.10	37.00	39.2			
32.60	33.00	31.9			
81.40	89.20	76.4			
52.30	48.00	52.5	48.0	53.0	50.0
26.10	24.00	24.7	26.0	24.0	26.0
50.20	50.00	47.2	54.6	44.0	53.5
79.20	80.90	76.4	84.5	85.0	83.5
68.10	70.40	73.6	78.5	78.2	68.2
52.90	49.60	50.9	49.3	53.5	50.7

LOW HEADED

Shows the comparative mean values of measurements & indices of low headed

	Low headed Dolicho meso cranial Harappa Male (5)	Hissar III Pseudo-Australoid Male (6)	Mohenjodaro (Proto-Australoid) Male (3)	Kish 'A' Male (1)	Aditta-nallur Male (1)
Maximum Cranial length.	186.00	192.00	197.00	187.80	183.0
Maximum cranial breadth.	139.00	135.83	130.00	132.20	124.0
Maximum cranial height.	132.60	135.34	139.00	133.10	128.0
Length breadth index	74.28	70.80	66.02	70.80	67.80
Length height index	72.83	70.53	70.68	71.80	70.00
Maximum bizygomatic br.	134.00	135.16	127.00	133.60	128.00
Upper facial height	63.60	73.50	......	66.80	70.00
Upper facial index	50.04	53.67	53.93	50.00	54.70
Orbital breadth	38.80	43.00	37.00	43.30	40.00
Orbital height	37.60	31.00	31.25	33.50	35.00
Orbital index	77.65	72.07	84.46	82.00	87.50
Nasal height	51.20	52.50	46.50	52.30	50.00
Nasal breadth	26.40	27.00	22.00	26.90	27.00
Nasal index	51.74	51.74	51.06	54.60	54.00

Table 10

DOLICHO MESO CRANIAL-TYPE

different cranial, facial, nasal and orbital dolicho meso cranial type

Proto-Australoid	Australian	Munda	Kol.	Proto-Negroid	Andamanese	Vedda
(Dixon)	Male (103)	Male (5)	Male (5)		Male (54)	Male (40)
190.00	186.6	179.2	180.5	181.0	167.2	178.84
132.00	130.8	128.8	132.4	130.0	135.6	126.36
128.00	133.8	130.4	130.8	130.8	128.9	132.73
69.50	70.1	69.57	73.38	72.0	81.1	71.24
67.50	71.8	73.70	72.57	76.7	77.1	74.64
131.00	135.1	126.52	132.0	129.0	123.3	120.71
67.00	68.9	58.62	63.5	65.0	62.7	60.03
51.70				50.4		
	44.2	40.34	42.92		37.1	38.05
	33.7	30.99	33.02		32.8	32.06
	76.2	....	76.89		88.8	74.02
48.00	50.2	47.46	52.0	47.0	45.6	44.47
27.00	27.2	25.44	24.62	26.0	23.8	24.44
56.20	54.0	54.54	......	55.6	51.1	54.24

EXPLANATION OF THE PLATES

Plate I

Skl. No.	*Figure No.*	*Site*	*Characters*
H. P. XXVI skl. 1	1, 2, & 3	Cemetery R. 37	Dolichocranial (C. I. 71. 12) Hyperchamaerrhine (N. 1.60.78) Mesoconch (0. 1. 80. 70)
H. P. XXVI skl. 2	4, 5 & 6	Cemetery R. 37	Dolichocranial (C. 1.71.51) Chamaerrhine (N. 1.55.56) Hypsiconch (O. 1.97.30)
H. 794	7, 8 & 9	Cemetery R. 37	Dolichocranial (C. 1.72.11) Leptorrhine (N. 1.46.43) Hypsiconch (O. 1.86.04)

Plate II

H. P. XXIX skl. 10	10, 11 & 12	Cemetery R. 37	Dolichocranial (C. I. 71.12) Leptorrhine (N. I. 46. 43) Mesoconch (O. I. 82. 03)
H. 796/B	13, 14 & 15	Cemetery R. 37	Dolichocranial (C. I. 71. 59) Chamaerrhine (N. I. 52. 34) Chamaeconch (O. I. 51. 85)

Stratum II

H. 699	16., 17 & 18	Cemetery H Open burial	Mesocranial (C. I. 77. 84) Mesorrhine (N. I. 50. 00) Hypsiconch (O. I. 92. 50)

Plate III

H. 805	19, 20 & 21	Cemetery R. 37	Dolichocranial (C. I. 70. 43) Mesorrhine (N. I. 48. 08) Hypsiconch (O. I. 97. 57)
G. III s. 21	22, 23 & 24	Area G	Dolichocranial (C. I. 71. 51) Mesorrhine (N. I. 50. 06) Hypsiconch (O. I. 94. 45)

Stratum II

H. 488	25, 26 & 27	Cemetery H Open burial	Dolichocranial (C. I. 70. 85) Hyperchamaerrhine (N. I. 63.41) Chamaeconch (O. I. 74. 81)

Skl. No.	*Figure No.*	*Site*	*Characters*
		Plate IV **Stratum I**	
H. 245E.	28, 29 & 30	Cemetery H Jar burial	Brachycranial (C. I. 80. 11)
H. 11635	31, 32 & 33	Mound AB	Mesocranial (C. I. 78. 72) Mesorrhine (N. I. 50. 00) Mesoconch (O. I. 83. 52)
		Plate V **Stratum I**	
H. 255(a)	34, 35 & 36	Cemetery H. Jar burial	Hyperdolichocranial (C.I. 67.88) Mesorrhine (N. I. 49. 06) Mesoconch (O. I. 77. 79)
		Stratum I	
H. 344	37, 38 & 39	Cemetery H. Jar burial	Mesocranial (C. I. 77. 35) Hyperchamaerrhine (N. I. 58.33) Mesoconch (O. I. 77. 18)
H. 820 (iii)	40, 41 & 42	Cemetery R. 37	Dolichocranial (C. I. 71. 20) Chamaerrhine (N. I. 53. 19) Mesoconch (O. I. 76. 86)

Plate VI

Comparative cranial type akin to Proto-Nordic.

Plate VII

Comparative cranial type akin to Proto-Mediterranean and Mediterranean

Plate VIII

Comparative cranial type akin to Proto-Mediterranean and Mediterranean

Plate IX

Comparative cranial type akin to Alpine and Armenoid type

Plate X & XI

Superimposition of mid-sagittal contours of Harappa crania viz. H. 793/A, H. P. XXVI skl. 1. H. 206(d), G. IIIs. 22, G. IIs. 47, H. 344, H. 698 & H. 793, on F. H. plane placed on similar contours of other crania viz Rupar, Lothal, Egyptian, Crete, Red Kaffir, Vedda Maski & Mohenjodaro.

ERRATA

Page	3	Foot note reference No 13	read	speizielle
,,		Foot note ,, ,, 17	,,	1901 A first study of the correlation of human skull Phil Trans. Roy. Soc. London Vol. 196, pp. 225-264.
,,	16	9th line	read	hyperchamaerrhine
,,	16	21 line	,,	Nippur
,,	16	23 ,,	,,	Alpine

PLATE I

Proto Nordic (Rugged type)

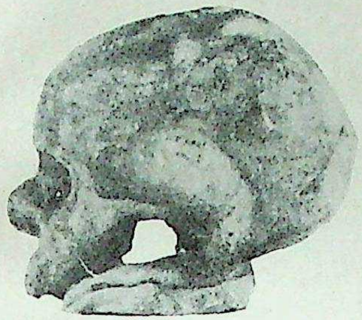


Fig. 1

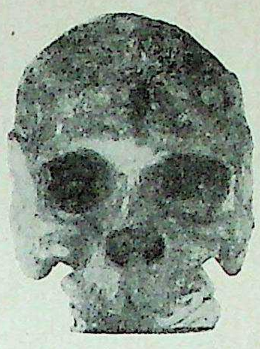


Fig. 2

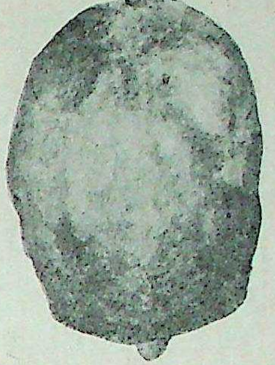


Fig. 3

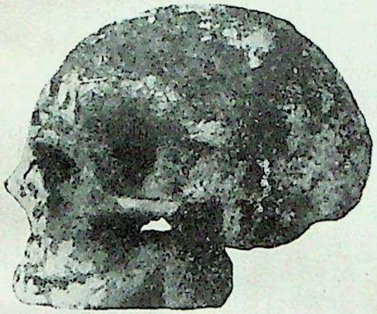


Fig. 4

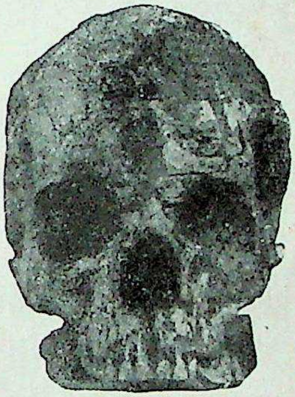
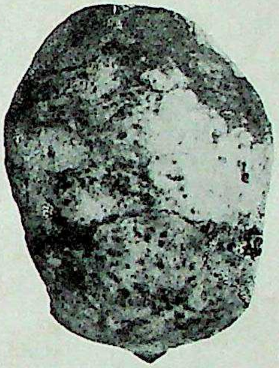


Fig. 5



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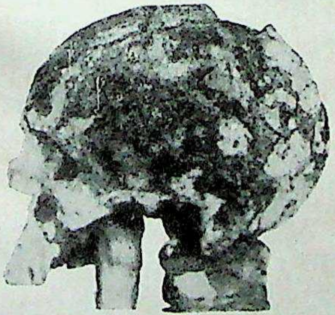


Fig. 7

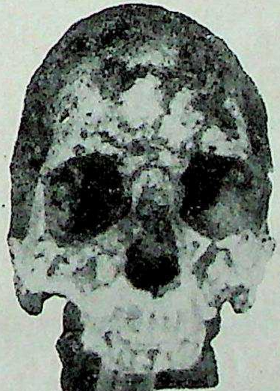


Fig. 8

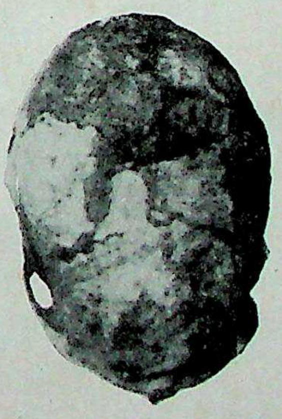


Fig. 9

Figs. 1, 2, 3—Norma lateralis, frontalis and verticalis of adult male skl. No. H. P. XXVI skl. 1

Figs. 4, 5, 6—Norma lateralis, frontalis and verticalis of adult female skl. No. H. P. XXVI skl. 2

Figs. 7. 8, 9—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 794.

PLATE II

Proto Nordic (Finer type)

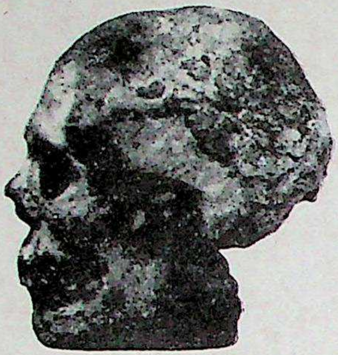


Fig. 10

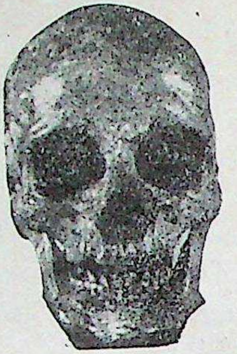


Fig. 11

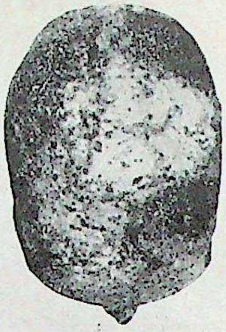


Fig. 12

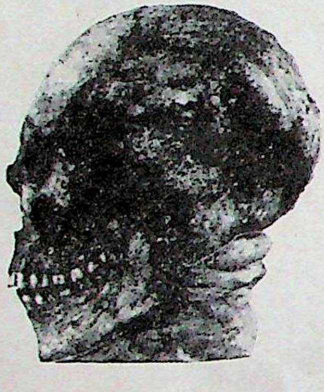


Fig. 13

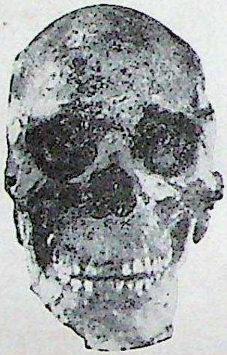


Fig. 14

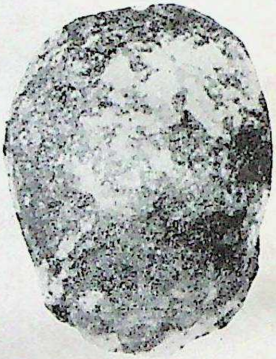


Fig. 15

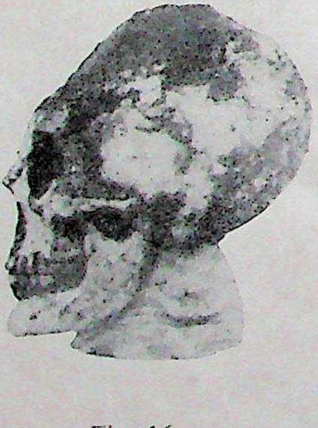


Fig. 16

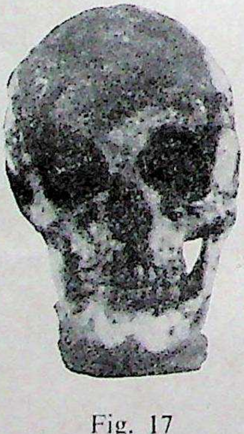


Fig. 17

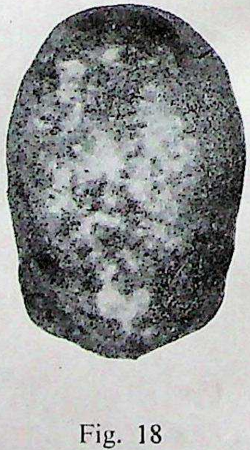


Fig. 18

Figs. 10, 11, 12—Norma lateralis, frontalis and verticalis of adult male skl. No. H. P. XXIX skl. 10.
Figs. 13, 14, 15—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 796/B.
Figs. 16, 17, 18—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 699.

PLATE III

Small smooth dolichocranial type (Proto Mediterranean-Mediterranean type)

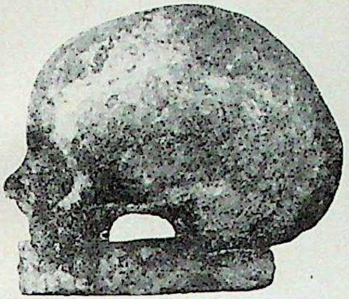


Fig. 19

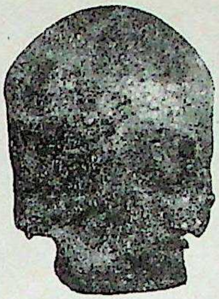


Fig. 20

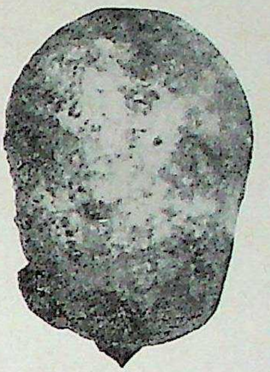


Fig. 21

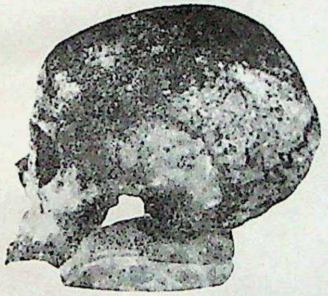


Fig. 22

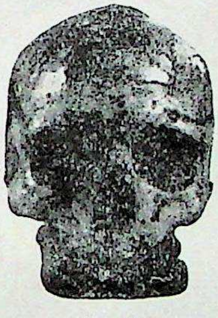


Fig. 23

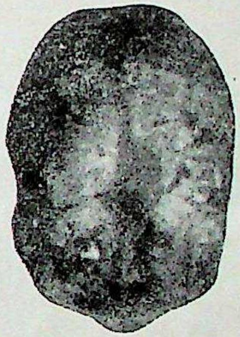


Fig. 24

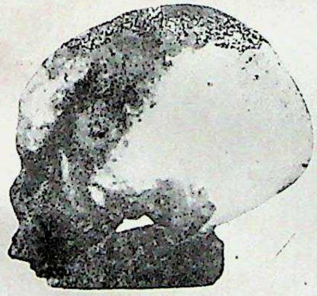


Fig. 25

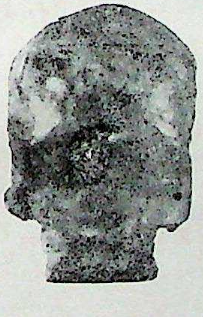


Fig. 26

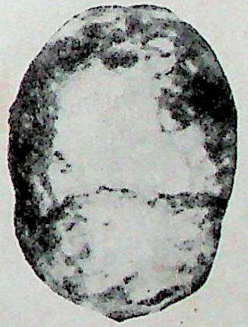


Fig. 27

Figs. 19, 20, 21—Norma lateralis, frontalis and verticalis of adult female skl. No. H. 805.
Figs. 22, 23, 24—Norma lateralis, frontalis and verticalis of adult female skl. No. G. III S. 21.
Figs, 25, 26, 27—Norma lateralis, frontalis and verticalis of adult female skl. No. H. 488.

PLATE IV

Alpine-Armenoid type

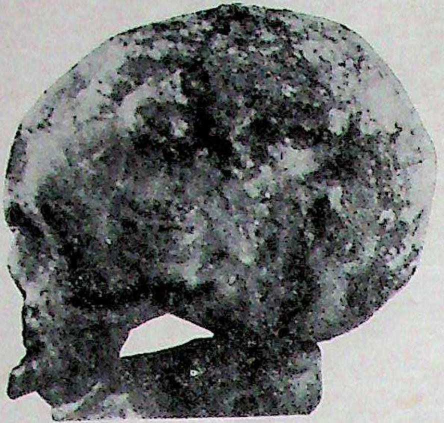


Fig. 28

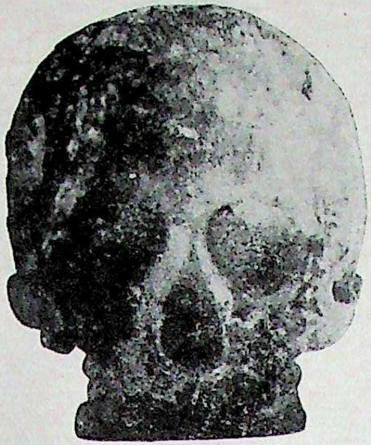


Fig .29

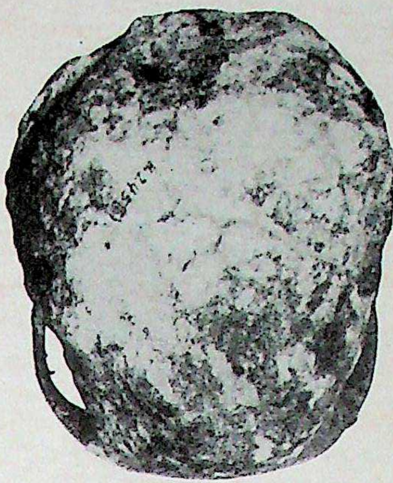


Fig. 30

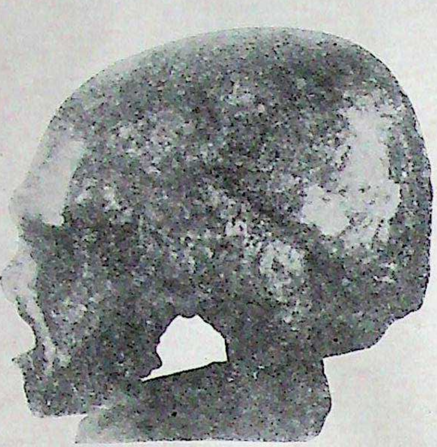


Fig. 31

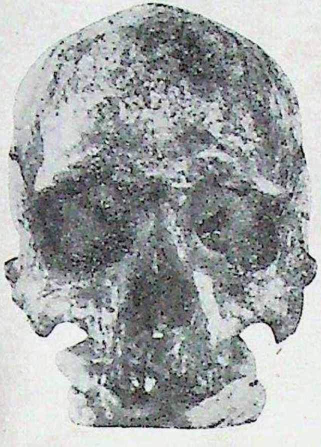


Fig. 32

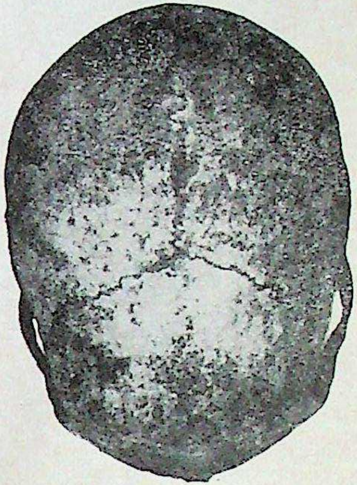


Fig. 33

Figs. 28, 29, 30—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 245E
Figs. 31, 32, 33—Norma lateralis frontalis and verticalis of adult male skl. No. H. 11635e

PLATE V

Low headed dolicho-mesoocranial type akin to Veddoid or Australoid type

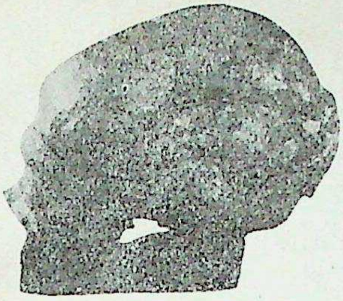


Fig. 34

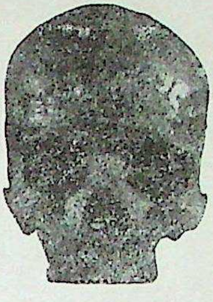


Fig. 35

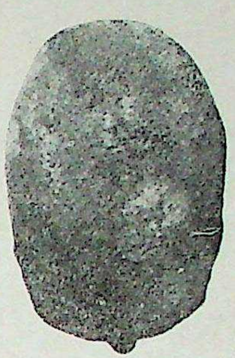


Fig. 36

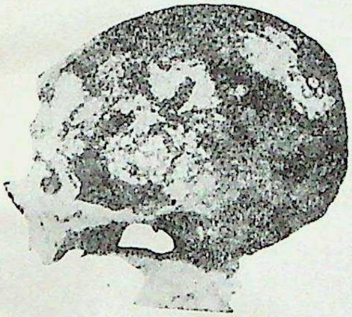


Fig. 37

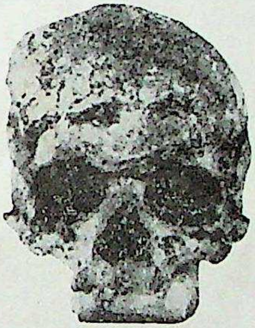


Fig. 38

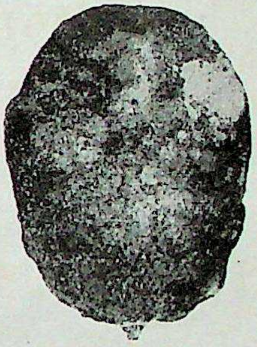


Fig. 39

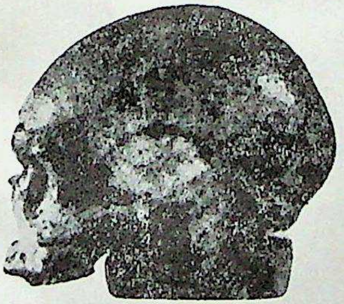


Fig. 40

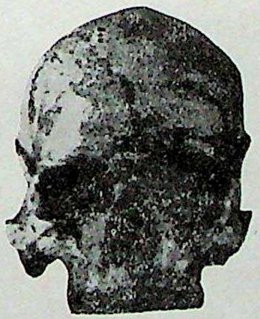


Fig. 41

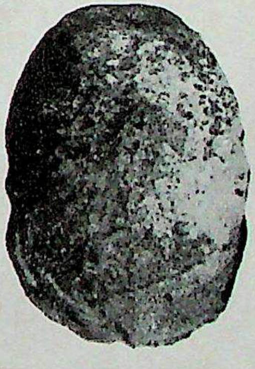
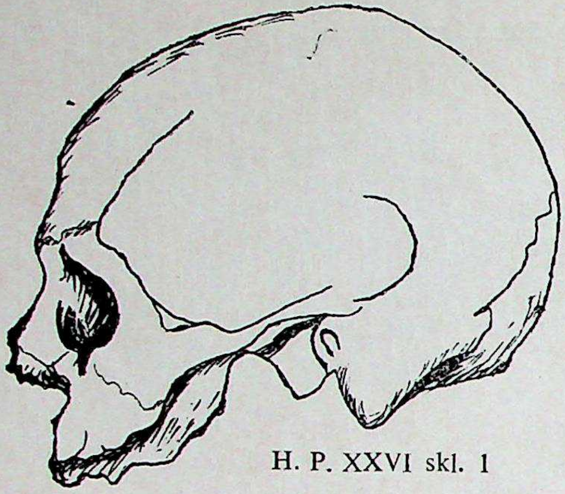


Fig. 42

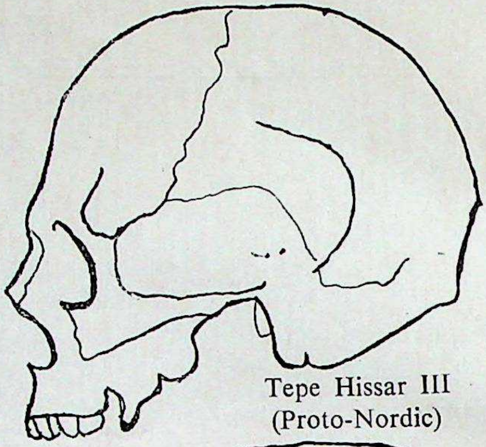
Figs. 34, 35, 36—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 255(a)
Figs. 37, 38, 39—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 344
Figs. 40, 41, 42—Norma lateralis, frontalis and verticalis of adult male skl. No. H. 820 (iii)

PLATE VI

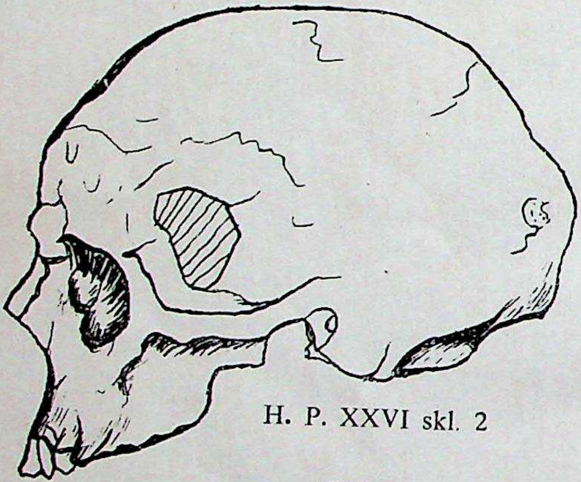
Comparative cranial type akin to Proto-Nordic



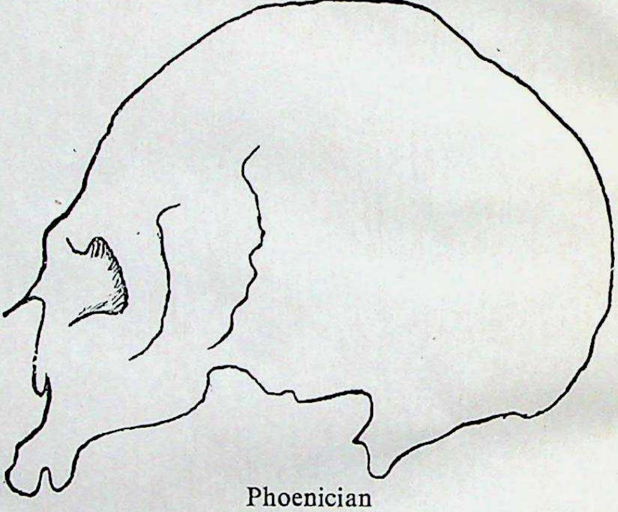
H. P. XXVI skl. 1



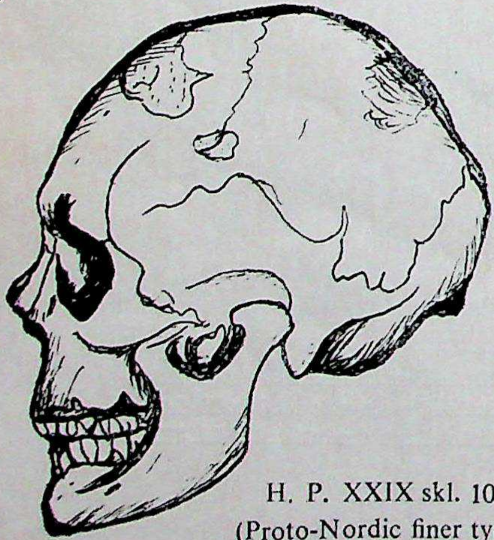
Tepe Hissar III
(Proto-Nordic)



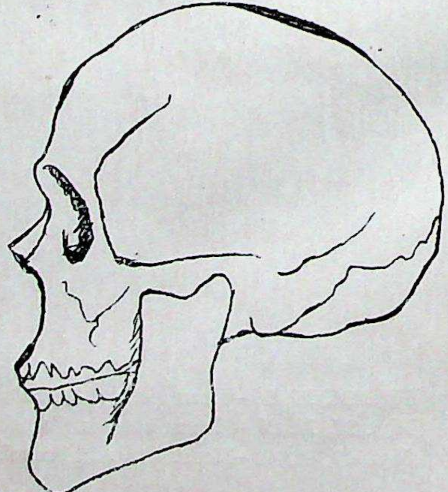
H. P. XXVI skl. 2



Phoenician
(13th century B.C.)



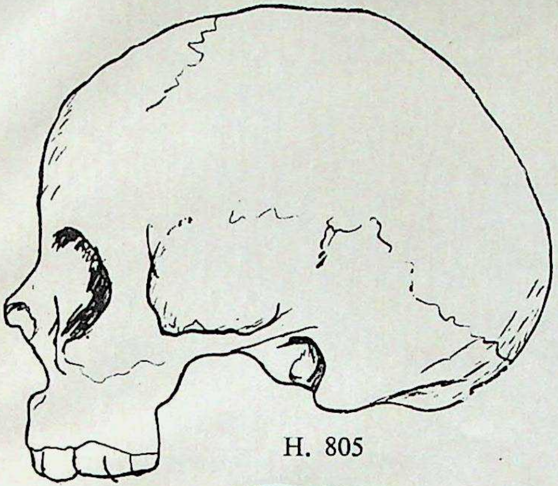
H. P. XXIX skl. 10
(Proto-Nordic finer type)



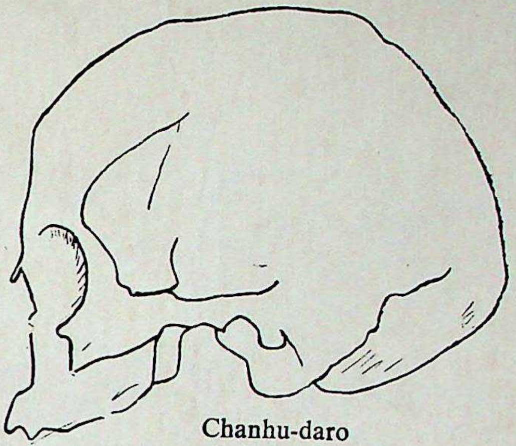
Nordic type

PLATE VII

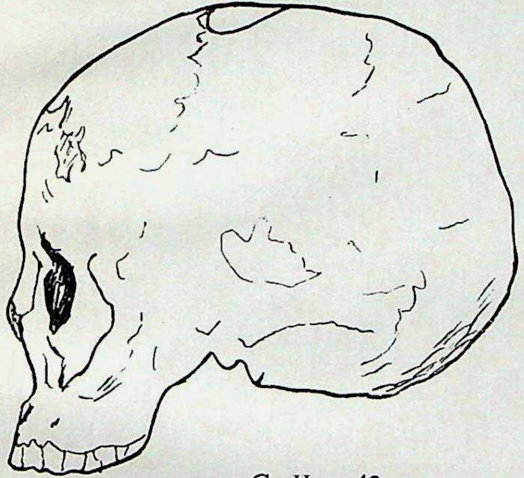
Comparative cranial type akin to Proto-Mediterranean and Mediterranean



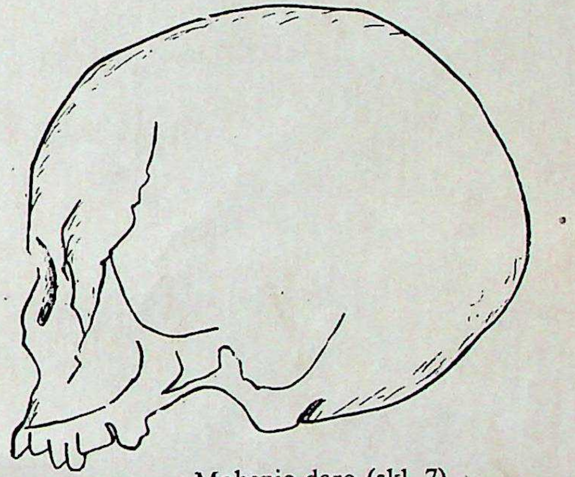
H. 805



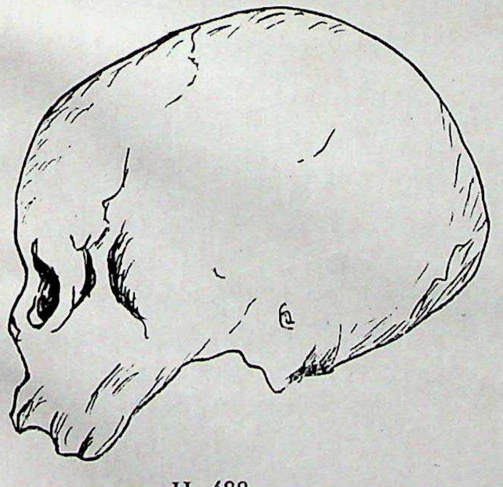
Chanhu-daro



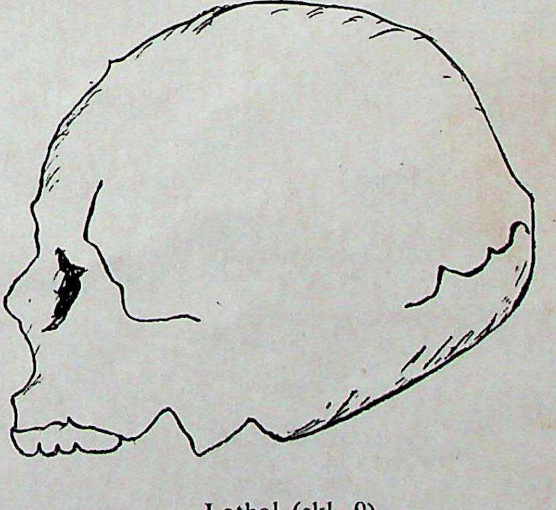
G. II s. 42



Mohenjo-daro (skl. 7)



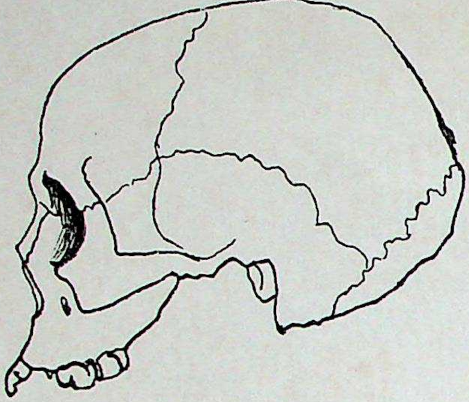
H. 488



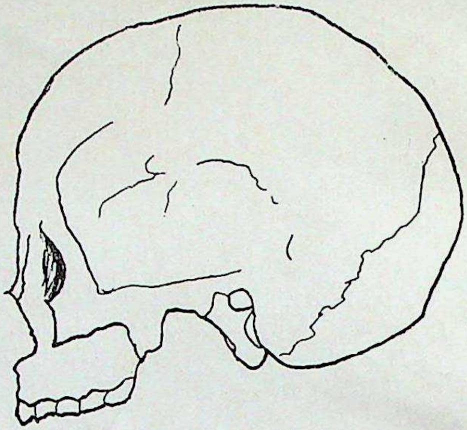
Lothal (skl. 9)

PLATE VIII

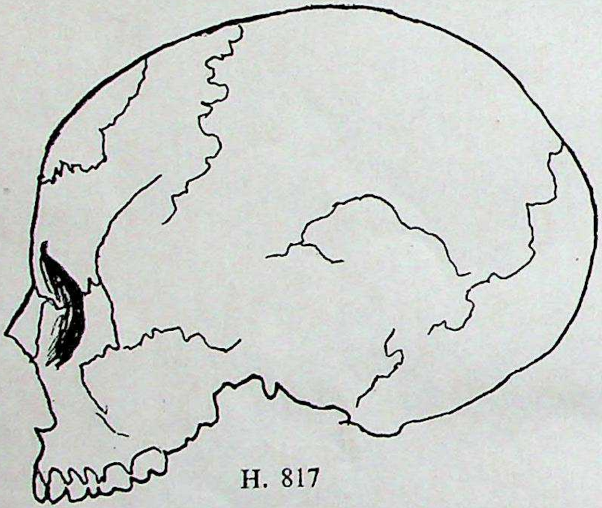
Comparative Cranial-type akin to Proto-Mediterranean & Mediterranean



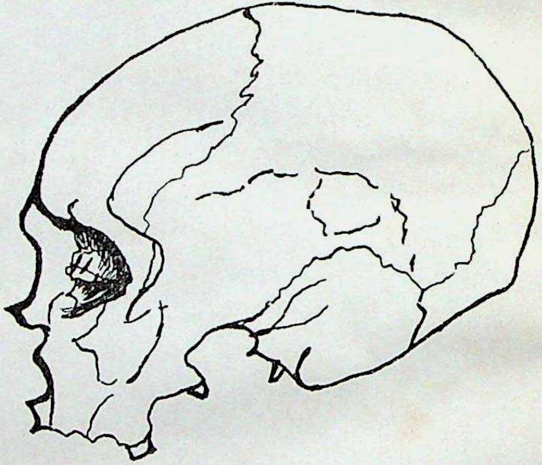
G. III s. 21



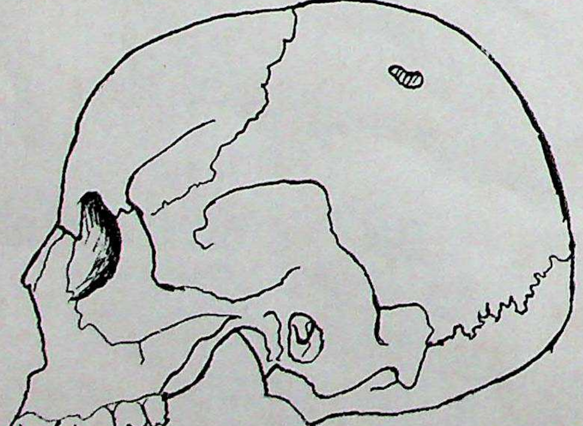
Tepe Hissar III
(Mediterranean)



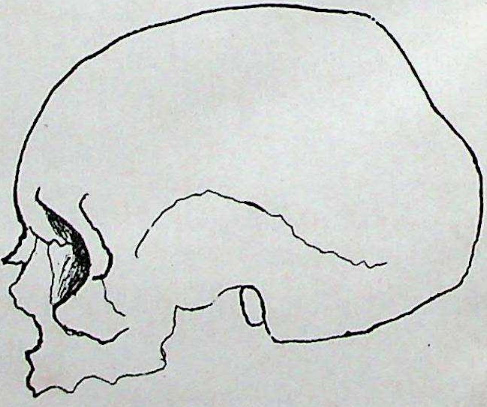
H. 817



Ur. No. 1 (Male)



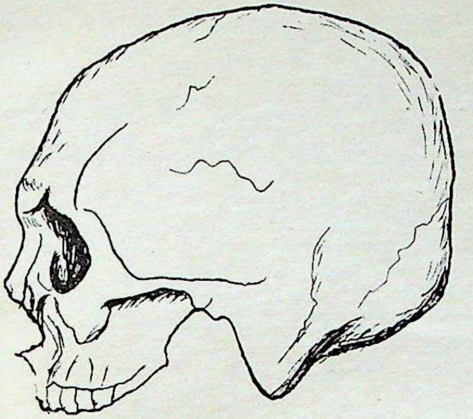
H. P. XXXII (Pot. 11)
Cemetery H. Jar Burial



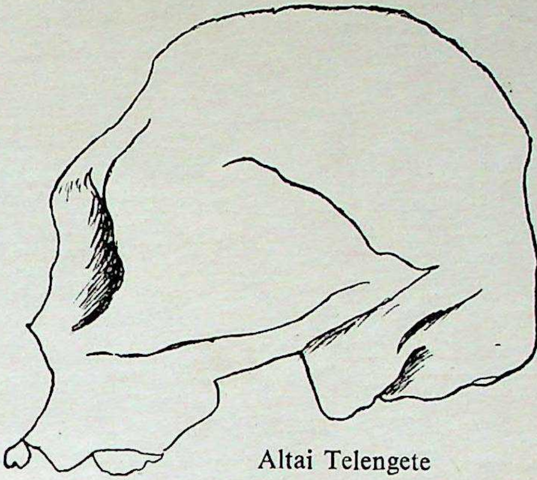
Nippur skull•
(Baghdad & Iraq)

PLATE IX

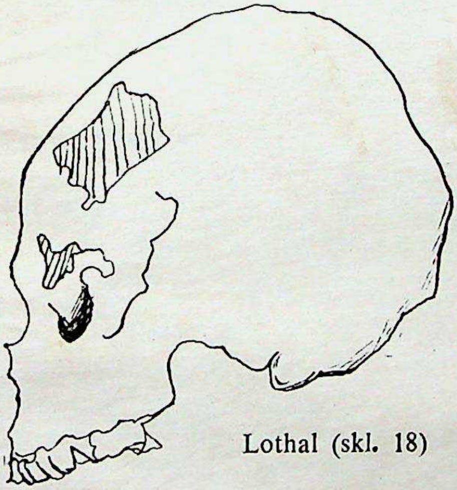
Comparative cranial type akin to Alpine and Armenoid type



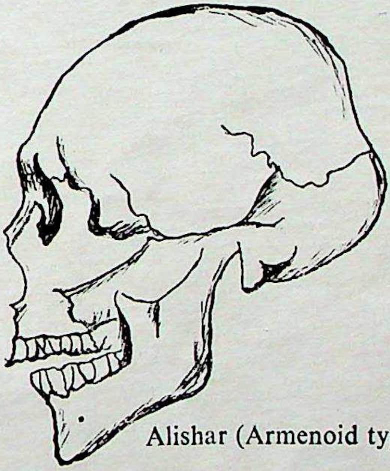
H. 11635



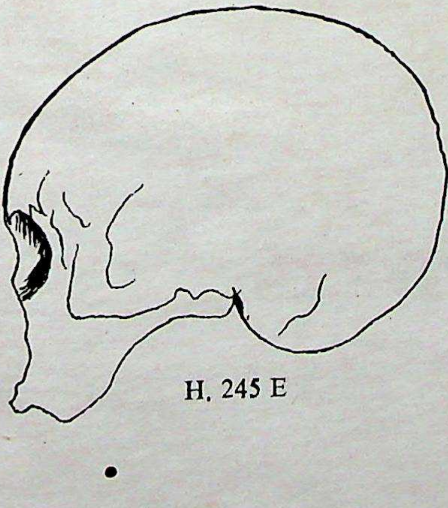
Altai Telengete



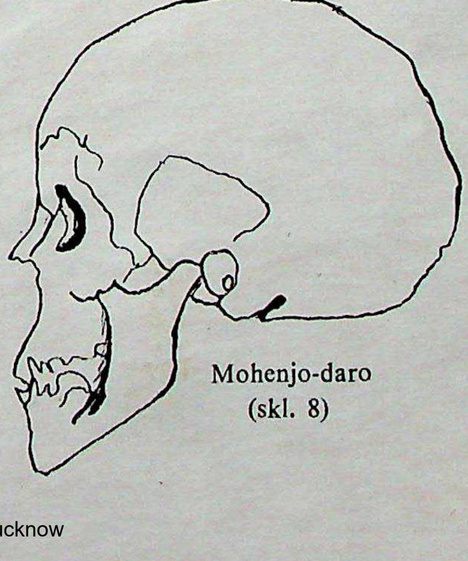
Lothal (skl. 18)



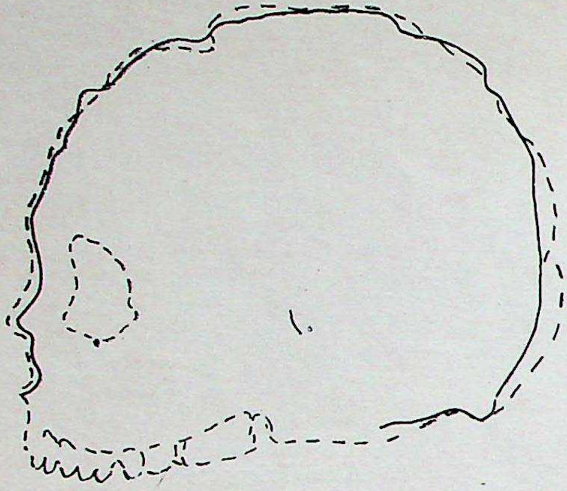
Alishar (Armenoid type)



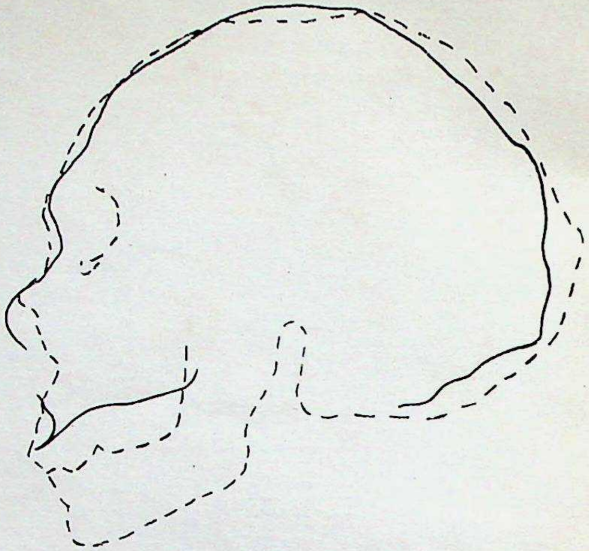
H. 245 E



Mohenjo-daro
(skl. 8)

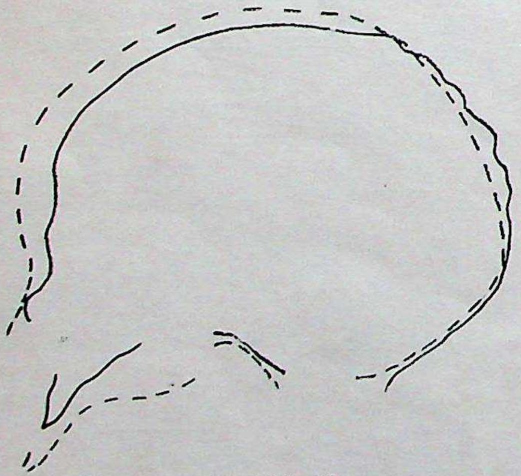


Harappa(H.793/A) ————
Rupar (R.P.R.3) - - - -

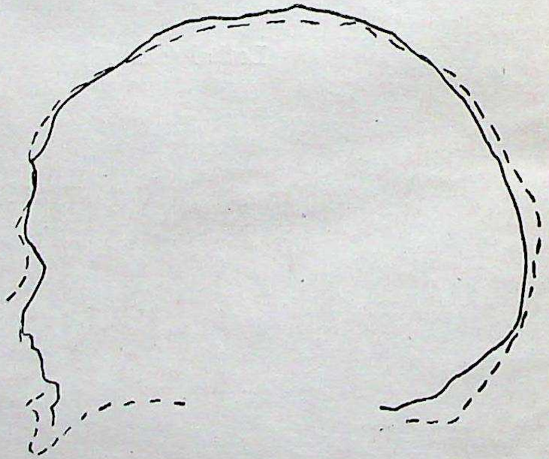


Harappa (H.P.XXVI skl.1) ————
Lothal (skl.10) - - - - -

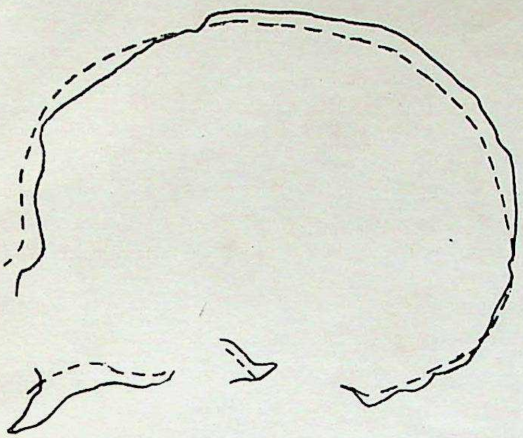
Plate X



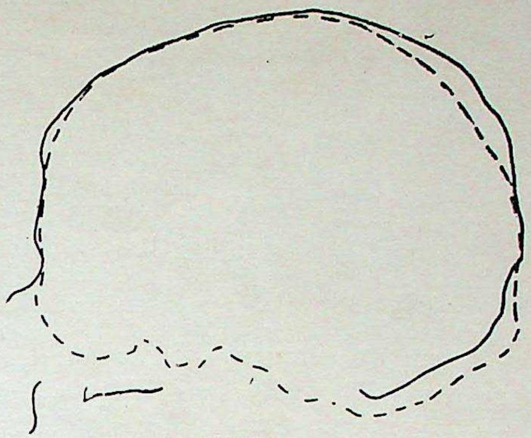
Harappa (H.206 d) ————
Egyptian - - - - - - - -



Harappa (G.III s.22) ————
Crete - - - - - - -

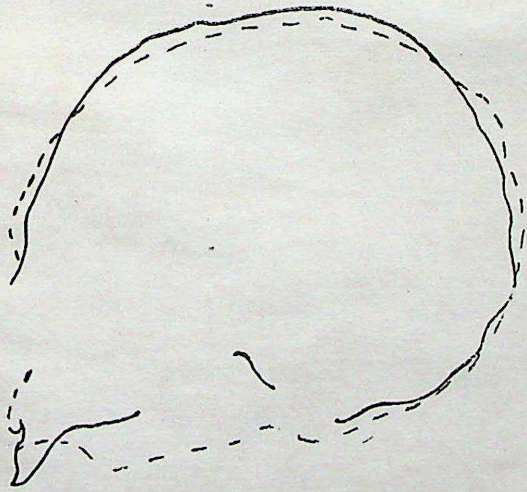


Harappa(GIII s.47) ———
Red Kaffir - - - - - - - - -

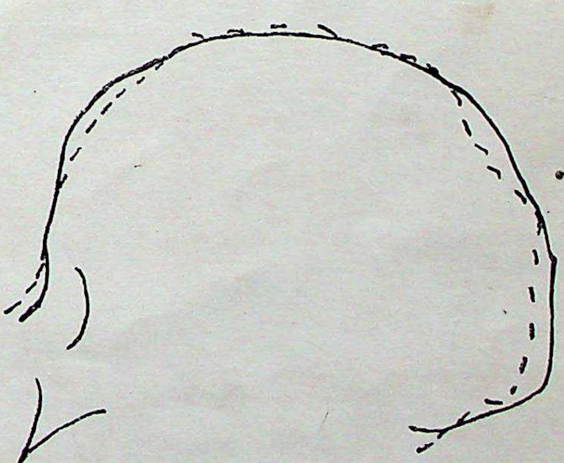


Harappa(H.344) ———
Vedda - - - - - - -

Plate XI



Harappa(H.698) ———
Maski - - - - - - - - -



Harappa(H.793) ———
Mohenjodaro(M.8) - - - -

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